

68

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MICRO JOURNAL

VOLUME III ISSUE IV • Devoted to the 68XX User • April 1981
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UniFLEX™



Multi-User

UniFLEX is the first full capability multi-user operating system available for microprocessors. Designed for the 6809 and 68000, it offers its users a very friendly computing environment. After a user 'logs-in' with his user name and password, any of the system programs may be run at will. One user may run the text editor while another runs BASIC and still another runs the C compiler. Each user operates in his own system environment, unaware of other user activity. The total number of users is only restricted by the resources and efficiency of the hardware in use.



Multi-Tasking

UniFLEX is a true multi-tasking operating system. Not only may several users run different programs, but one user may run several programs at a time. For example, a compilation of one file could be initiated while simultaneously making changes to another file using the text editor. New tasks are generated in the system by the 'fork' operation. Tasks may be run in the background or 'locked' in main memory to assist critical response times. Inter-task communication is also supported through the 'pipe' mechanism.



Support

The design of UniFLEX, with its hierarchical file system and device independent I/O, allows the creation of a variety of complex support programs. There is currently a wide variety of software available and under development. Included in this list is a Text Processing System for word processing functions, BASIC interpreter and precompiler for general programming and educational use, native C and Pascal compilers for more advanced programming, sort/merge for business applications, and a variety of debug packages. The standard system includes a text editor, assembler, and about forty utility programs. UniFLEX for 6809 is sold with a single CPU license and one years maintenance for \$450.00. Additional yearly maintenance is available for \$100.00. OEM licenses are also available.

FLEX™

UniFLEX is offered for the advanced microprocessor systems. FLEX, the industry standard for 6800 and 6809 systems, is offered for smaller, single user systems. A full line of FLEX support software and OEM licenses are also available.



Box 2570, West Lafayette, IN 47906
(317) 463-2502 Telex 276143

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'68'

Portions of text prepared using the following.

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Southwest Technical Products
219 W. Rhapsody
San Antonio, Texas 78216

EDITOR - WORD PROCESSOR
Technical Systems Consultants, Inc.
Box 2573, W. Lafayette, IN 47906
FLEX is TM of TSC

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GIMIX Inc.
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----- —ITEMS SUBMITTED FOR PUBLICATION—

(Letters to the Editor for Publication) All 'letters to the Editor' should be substantiated by facts. Opinions should be indicated as such. All letters must be signed. We are interested in receiving letters that will benefit or alert our readers. Praise as well as gripes is always good subject matter. Your name may be withheld upon request. If you have had a good experience with a 6800 vendor please put it in a letter. If the experience was bad put that in a letter also. Remember, if you tell us who they are then it is only fair that your name 'not' be withheld. This means that all letters published, of a critical nature, cannot have a name withheld. We will attempt to publish 'verbatim' letters that are composed using 'good taste.' We reserve the right to define (for '68' Micro) what constitutes 'good taste.'

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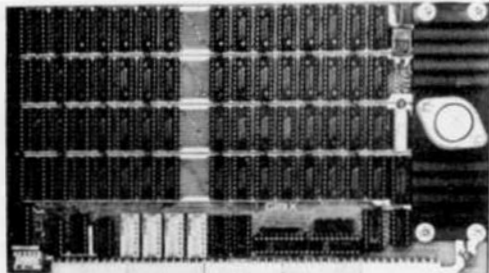
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2 Port Parallel	88.42

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OS-9™ MULTIPROGRAMMING OPERATING SYSTEM

A true multitasking, real time operating system for timesharing, software development, database, process control, and other general applications. This versatile OS runs on almost any 6809-based computer.

- UNIX™ like file system with hierarchical directories, byte-addressable random-access files, and full file security.

- Versatile, easy-to-use input/output system is hardware independent and expandable to support almost any device with interrupt-driven, program-control, or DMA data transfer.

- Powerful "shell" command interpreter features: I/O redirection, multiple job stream processing, and more. Includes a comprehensive set of utility command programs.

- OS-9 Level Two uses hardware memory management and can address over one megabyte of memory. Also includes pipes and filters for inter-process data transfers.

- OS-9 Level One runs on systems without memory management hardware having up to 56K memory.

☐ OS-9 Level Two
Operating System \$495.00*

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Operating System \$195.00*

STYLOGRAPH™ WORD PROCESSOR

A full-feature screen-oriented word processing system for interactive document entry and editing. Has cursor-oriented commands with dynamic screen refresh so the display is an exact image of the printed text.

- Editing commands include: line and character insertion and deletion; global string searching and replacement; "cut and paste" text rearrangement, etc.

- Formatting commands for: paging; left, right and center justification; headers and footers; line length and margins; and much more.

- I/O drivers for many popular video terminals including Hazeltine, ADDS, SWTPC, GIMIX and others.

☐ Standard version \$175.00

☐ Special version for proportional printers \$195.00

INTRODUCING

6809 SOFTWARE POWER TOOLS

BY MICROWARE™

BASIC9™ PROGRAMMING LANGUAGE SYSTEM

Extended BASIC language compiler/interpreter with integrated text editor and debug package. Runs standard BASIC programs or minimally-modified PASCAL programs.

- Permits multiple named program modules having local variables and identifiers. Modules are reentrant, position independent and ROMable.

- Additional control statements for structured programming: IF ... THEN ... ELSE, FOR ... NEXT, REPEAT ... UNTIL, WHILE ... DO, LOOP ... ENDLOOP, EXITIF ... ENDEXIT.

- Allows user-defined data types and complex data structures. Five built-in data types: byte, integer, 9 digit floating-point, string and boolean.

- Outperforms any other BASIC on any 8-bit MPU.

- Available on disk. Runs under OS-9™ Level One or Level Two.

☐ Disk \$195.00*

OS-9™ TEXT EDITOR

Minimum-keystroke macro text editor useful for text preparation or interactive word processing.

- User-defined macros with parameters permit virtually unlimited command expansion. Macros can be saved, loaded

and edited.

- Buffer, line and character oriented commands.

- Search, change and extend operations.

- Permits multiple input/output files.

☐ Disk \$95.00

OS-9™ INTERACTIVE ASSEMBLER

Compact Motorola compatible assembler for machine language program development.

- Operates in "batch" mode or interactive line-by-line mode.

- Facilities for generation of OS-9™ memory modules and system calls.

- Formatted listings include syntax and context error checking.

- Runs on OS-9™ Level One or Level Two.

☐ Disk \$95.00

OS-9™ INTERACTIVE DEBUGGER

Facilitates testing and debugging of machine-language programs.

- Includes common "monitor" functions: memory examine/change, breakpoints, display/change registers, etc.

- Calculator mode evaluates arithmetic expressions in hex, decimal or binary.

- Access to system commands.

- Available on ROM and disk.

☐ Disk \$35.00

☐ ROM (2716) \$50.00

BASIC9 and OS-9 are trademarks of Microware® and Motorola. UNIX is a trademark of Bell Laboratories.

Most software is available on ROM, and diskette in versions for many popular 6809 computers. Source listings and yearly maintenance/update service are sold separately for most programs.

*Specify manufacturer and type of CPU and I/O controllers. Contact Microware® for specific availability.

MICROWARE®

Microware Systems Corp., Dept. M3
5835 Grand Avenue
Des Moines, Iowa 50304
(515) 279-8844
TWX 910-520-2535

A/BASIC COMPILER

This BASIC compiler generates pure, fast, efficient 6800 machine language from easy to write BASIC source programs. Uses ultra-fast integer math, extended string functions, boolean operators and real-time operations. Output is ROMable and runs without any run-time package. Disk versions have disk I/O statements and require 12K memory and host DOS.

- ☐ Disk Extended Version 2.1
SSB or FLEX* Diskette \$150.00

A/BASIC SOURCE GENERATOR

An "add-on" option for A/BASIC Compiler disk versions that adds an extra third pass which generates a full assembly-language output listing and assembly language source file. Uses original BASIC names and inserts BASIC source lines as comments.

- ☐ SSB or Flex* Diskette \$95.00

A/BASIC INTERPRETER

Here it is - a super-fast A/BASIC compiler! Now you can interactively edit, execute and debug A/BASIC programs with the ease of an interpreter - then compile to super efficient machine language. Also a superb stand-alone applications and control-oriented interpreter. Requires 8K RAM. The cassette

INNOVATION AND PERFORMANCE

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BY MICROWARE®

version is perfect for Motorola D2 kits.

- ☐ SSB or Flex* Diskette \$95.00

LISP INTERPRETER

The programming language LISP offers exciting new possibilities for microcomputer applications. A highly interactive interpreter that uses list-type data structures which are simultaneously data and executable instructions. LISP features an unusual structured, recursive function-oriented syntax. Widely used for processing, artificial intelligence, education, simulation symbolic, and computer-aided design. 6800 LISP requires a minimum of 12K RAM.

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RT/68 REAL TIME OPERATING SYSTEM

MIKBUG — compatible ROM that combines an improved monitor debugger with a powerful multitasking real-time operating system. Supports up to 16 concurrent tasks at 8 priority levels plus real time clock and interrupt control.

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- ☐ RT68MX (6830) \$75.00
☐ RT68MXP (2708) \$75.00

6800 CHESS

A challenging chess program for the 6800. Two selectable difficulty levels. Displays formatted chess board on standard terminals. Requires 8K memory. Machine language with A/BASIC source listing.

- ☐ SSB or FLEX* Diskette \$50.00

Our software is available for most 6800 systems on diskette unless otherwise noted. Phone orders welcomed. We accept MASTERCARD and VISA. We try to ship orders within 24 hours of receipt. Please call or write if you require additional information or our free catalog. Microware® software is available for OEM and custom applications.



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STYLOGRAPH WORD PROCESSOR FOR OS-9™

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The display cursor can be moved character-by-character, line-by-line, or page-by-page in any direction. The full compliment of "cut-and-paste" edit commands permit blocks of text to be moved, copied, searched for, replaced and deleted. The "global replace" command searches for each occurrence of a given text string and allows selective replacement with another string. In the "insert" mode the text is actually formatted before your eyes as you type!

■ Complete Formatting Control

Text or individual lines can be center, left, right, or left-and-right justified; page and line width can be specified; multiple tabs can be set anywhere. You can define page heading, footers, page numbering, indentation and line spacing.

■ Versatile Video Terminal Interface

The basic Stylograph module uses a "personality module" to define the display control codes used by many brands of video terminals and memory-mapped video displays including: Hazeltine 1400/1500 series; Lear-Seigler ADM3-A; GIMIX 80x24; SWTPC CT-82 and 8212; and ADDS Regent series.

- ☐ \$175.00
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SOFTWARE!

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FOR THE 80'S

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By Charles (Chuck) Eaker, Ph.D

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She uses standard MOTOROLA mnemonics thus: 'LOA [44]' becomes '[44] LDA' in X-FORTH 6809 assembler also supports 6800 mnemonics!

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You the programmer have complete control over disk related errors while other errors provide long error messages. X-FORTH has a protected dictionary and is very hard to accidentally crash!

String primitives, Complete DATA FILE VOCABULARY, Triple precision math package, Parity between 6800 and 6809 versions of X-FORTH, Compatible with FIG FORTH, AND, THERE'S EVEN MORE WE DON'T HAVE ROOM TO LIST!

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New Price

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Job Control Program
By Peter Murray

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JCP is used as a FLEX program within a program to load and execute another program. It is very easy to use and a great aid to the programmer. It is available in a hard copy or on disk. Price \$39.95. See Review in July 80 68 Micro.

ONLY \$49.95
WITH SOURCE ON DISK \$69.95
6800 UPGRADE TO 6809 \$39.95

READTEST
English Text Analysis Program
By Dale Packett

READTEST is a must for all editors and writers. Reads prose from disk file and tells how well it was written. Reports number of lines, words, sentences, paragraphs as well as other statistics. Individual reports programs available or on. Overall index tells who can read it and who would profit. See disk subject code. Runs on FLEX 6800 MICRO JOURNAL and other FLEX 6800 systems. It is a program with which you can gauge your progress. You will find how well you are already an experienced writer. That READTEST will keep you honest when you start writing.

See Review in August 80 68 Micro
INCLUDES SOURCE ON DISK

PRICE \$54.95

BASICO935

FOR 6809 ONLY

This Basic and vector program originally written for SWTPC 3.5 Basic. You use your old manual! Also included are these utilities: Set Level, No Error, Error, Abort, Exit, and Return. Run 6809 Basic because of compressed code (not relocatable). Includes disk with manual of added features.

PRICE \$49.95

REMOTE
Intelligent Terminal Program
By Tom Speer

REMOTE allows use of 6800 or 6809 system as a remote computer. Gives you access to many sharing systems designed for home computer users. With MICROFLEX or THE SOURCE. All you need is an FLEX-based 6800 disk system, a serial interface, a modem, and REMOTE. REMOTE will support the TTY Throttle, Modem Card, and includes SOURCE ON DISK.

PRICE \$39.95

ESTHER
An exercise in artificial intelligence
By Dale Packett

ESTHER is a simple artificial intelligence program. ESTHER remembers names, drops them, uses the player's name, and uses other features. ESTHER identifies more than 75 words and uses about fifty sets of replies. ESTHER is a simple program and runs on FLEX. She always TTYSET. She is built educational and fun.

INCLUDES SOURCE ON DISK

PRICE \$39.95

HELP
Help for FLEX
By Frank Hogg

Forget the command syntax? Type HELP. HELP keeps information of your fingertips. It eliminates the need to fumble through manuals and also helps beginners control your computer. The HELP interpreter with its commands reads information from one of three text files, adding, modifying or deleting information as you. You can also create your own HELP file. Everybody needs a little HELP.

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\$149.⁹⁵

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Coming Soon

Programs by Dick Bartholomew

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DISKDUMP, REPLACE, INPT, LOAD

UTILITIES #2

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RESTORE

PASSWORD - password protection for your system

CRITSET, PASGEN, CODEWORD, INITS,
OPASWORD

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DECOMPILE XBASE PROGRAM - Cross
Reference Basic Program

SHARE - share one computer between two
terminals

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SUPER SLEUTH Professional Disassembler System

- runs on 68001/9, analyzes 68001/5/9 & 6502 codes
- generates 68001 ASM code from 68001 code
- generates 6805 ASM code from 68001/9 code
- generates 6805 ASM code and 6502 ASM code
- automatic labels, optional FCB, FCC, FDB's
- optionally generates 6809 relocatable code
- input binary file from disk or from memory
- memory changes to program thru full-screen editor
- output disk file may be source or new binary file
- commands from menu or from and to disk file
- generates FLEX and user defined names
- includes assembler language XREF program \$100.00

6805/6801/6502 Macros for TSC 6809 ASM EA M \$ 50.00
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See New

JCP Price

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We are looking for quality software to market ... Contact Frank Hogg.



N D E F G H I J K L M N O P Q R S T U V W X Y Z , / ; [@ ^] - 1 () = } ~ &

Epson MX-80 Print Sample

Shown are five of the twelve possible variations of print characters.

South East Media
P.O. Box 794 Hixson, TN 37343
1-615-870-1993

10 CPI Standard

ABCDEFGHIJKLMN OPQRSTUVWXYZ ABCDEFGHIJKLMN OPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz abcdefghijklmnopqrstuvwxyz
12345678901234567890!#\$%&'()*+=<>? !#\$%&'()*+=<>?
EPSON MAKES MORE PRINT MECHANISMS THAN ANYONE ELSE IN THE WORLD.
Epson makes more print mechanisms than anyone else in the world.

10 CPI Emphasized

ABCDEFGHIJKLMN OPQRSTUVWXYZ ABCDEFGHIJKLMN OPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz abcdefghijklmnopqrstuvwxyz
12345678901234567890!#\$%&'()*+=<>? !#\$%&'()*+=<>?
EPSON MAKES MORE PRINT MECHANISMS THAN ANYONE ELSE IN THE WORLD.
Epson makes more print mechanisms than anyone else in the world.

5 CPI Double Emphasized

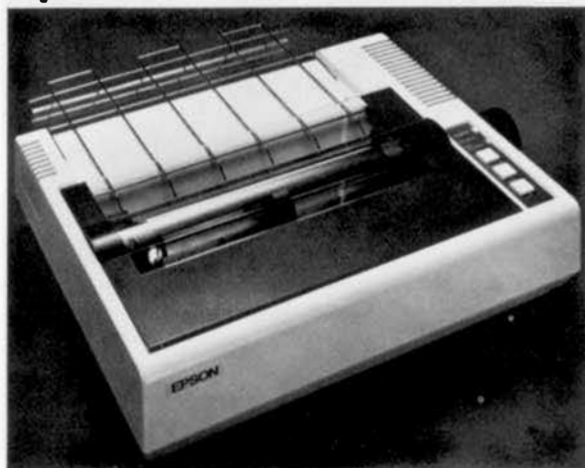
ABCDEFGHIJKLMN OPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890: - !#\$%&'()*+=<>?
EPSON MAKES MORE PRINT MECHANISMS
Epson makes more print mechanisms

8.25 CPI Double Emphasized

ABCDEFGHIJKLMN OPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890: - !#\$%&'()*+=<>?
EPSON MAKES MORE PRINT MECHANISM
Epson makes more print mechanism

16.5 CPI Standard

ABCDEFGHIJKLMN OPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
12345678901234567890!#\$%&'()*+=<>? !#\$%&'()*+=<>?
EPSON MAKES MORE PRINT MECHANISMS THAN ANYONE ELSE IN THE WORLD.
Epson makes more print mechanisms than anyone else in the world.



Print method: Serial impact dot matrix
Print Rate: 80 CPS
Print Direction: Bidirectional
Number of Pins in Head: 9
Line Spacing: 18", 16", 12", plus programmable
Throughput at 80 CPI: 105 LPM, 20 character line; 73 LPM, 40 character line; 46 LPM, 80 character line.

PRINTING CHARACTERISTICS
Character Set: Full 96 character ASCII with 26 lowercase and 26 uppercase letters
Standard: Double (advancer paper 120th and repeat line)
Emphasized (shift right and double strike)
Double Emphasized (combination of above)

PRINTING SIZES

	Characters per inch	Max. Characters per line
Normal	10	80
Normal Expanded	5	40
Expanded	5.5	132
Expanded Expanded	8.25	on

FORMS HANDLING
Line Feed: Programmable length 1 to 8572nds
Form Feed: Programmable length to 66 lines
Horizontal Tab: To 112 positions
Vertical Tab: To 64 positions

MEDIA HANDLING
Paper Feed: Adjustable to 11.5" x 14" per feed
Paper Width Range: 6" to 11"
Number of Paths: 1
Paper Path: Rear

INTERFACES
Standard: Centronics-style 8-pin Parallel
Optional: RS232C, IEEE488
Buffer Size: 1 Kbit

SWITCHES/LIGHTS/DETECTORS
Indicators: Power Light, Printer Ready, Paper Out, On Line
Switches: Power On/Off, On Line, Form Feed, Line Feed
Detectors: (Initial buzzer (bell) responds to Paper Out and error conditions with a periodic 3-second tone for 30 seconds)

RELIABILITY
Print Head Life: 50 to 100 x 10⁶ characters
MCBF (Excluding Print Head): 5 million lines

INKED RIBBON
Color: Black
Type: Cartridge
Life: 3 Million characters

ENVIRONMENTAL CONDITIONS
Operating Temperature: 51°F to 95°F
Operating Humidity: 10 to 85% non-condensing

POWER REQUIREMENT
Voltage: 115V, 240V
Current: ~1 amp
Power Consumption: 300 VA maximum

SELF TEST MODE
Depressing Line Feed Switch while turning power ON engages self test which prints all characters in ROM

PHYSICAL CHARACTERISTICS
Length: 6.2"
Width: 14.7"
Depth: 12.0"
Weight: 12.4 lbs
Specifications subject to change without notice.

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\$55 IEEE Interface

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a b c d e f g h i j k l m n o p q r s t u v w x y z ! " \$ % & ' () * + , - . / : ; [\] ^ _ ` { | } ~ &

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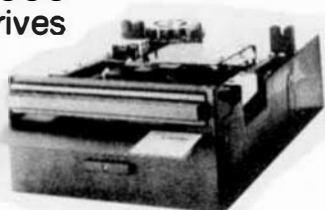
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'THEY'

Like taxes and death, "they" are surely coming! "They" being the Japanese. Actually "they" are already here but not nearly as visible as they will be very soon. Daily as I talk to vendors and manufacturers of Standard 550 Bus computers and accessories, I seem to get the feeling that no one is very concerned. Well, I certainly am! Not that we cannot hold our own against any small computer invasion, but we are going to have to get on the ball, and soon, or the price and quality difference is going to 'got-cha' some of us.

I could fill the pages of this issue with the names of large and strong companies who ignored the Japanese hordes of 'just as good as - and a lot cheaper', competing products. Complacency has bumped off more going concerns than all the recessions, depressions and plagues ever did.

Don't wait for the government to help us out, look at Detroit. Even more impressive(?) is the situation in the solid state market. Back in 1970 (not that long ago) the Japanese had 0%, of the world market. By 1974 the Japanese share of the world market was a measly 5%. 1978 saw a Japanese chunk totalling 45%. And by late 1980 "they" had carved out a solid 70% of the world market and projecting 85% by 1982! Now that is something to think about. The part that makes it even more severe is that "they" have a better grip on the hardware end of the computer situation than they had on solid state devices. Which means that the 'market clock' moves faster in this case than the previous years.

Everyone seems to believe that software is going to be a major stumbling block for their intrusion. Don't you believe it; the Japanese are recruiting programmers right now who will write or patch all the software "they" need. I know as I have been contacted by no less than 5 major Japanese firms wanting information and personal referrals concerning the 6809 and 68000.

The time element is not nearly as long as many believe. The hard ground work for most all types of software has already been plowed here in the good ole USA. Their task is much simpler and will require much less time than we have spent over the past 5 or 6 years. Smart money 'venture' capital types see it, we had better also and soon!!!!

Flex User Notes

BY: RONALD W. ANDERSON
3540 STRUBBRIDGE COURT
ANN ARBOR, MI 48105

SOFTWARE AVAILABLE

Several months ago, I reviewed TSC's disk and memory diagnostics package for FLEX9. These are now available for the 6800 FLEX'es too. I'm happy to see that TSC at least, is not abandoning the 6800 users out there who don't see enough advantages to switching to the 6809 to warrant the costs.

More recently, I mentioned JCP from Frank Hogg, as being available for the 6800. Frank has now announced the 6809 version.

Programma International has, or will soon have available a nice screen oriented editor Flex compatible in 6800 and 6809 versions. Their editor was been available for some time for the APPLE II system. They call it the Programma Interactive Editor (PIE of course). We were thinking the other day about all the

terrible puns that hinge on APPLE, and decided that if we were to write a companion program or enhancement of PIE we would either call it CRUST or ALA MODE. A friend of mine is reviewing PIE presently and I have promised not to beat him to the review, but I can say that it is very nice, lacking only complete formatting capabilities. It is great for editing source programs in any language thanks to some nice auto-indent features.

Lucidata has announced release 3.0 of their Pascal compiler and indicated to me that the 6809 version is not just reassembled 6800 code, but has been optimized for the 6809. The new release has several added features in the way of additions "to bring it closer to the ISO standard" and also some extensions to make it easier to interface with devices external to the microcomputer system. Let me quote a portion of the announcement. "Of course, we would like to have absolutely everything in our Pascal, but we know that it would make the P-6800 System too big to be useful for the sort of applications our customers are using it for. However, by popular demand we have added VAR parameters and Dynamic variables. Also you will now be able to declare multiple USER functions and procedures by name. These may then be linked to assembler routines via the EXTERNAL facility. This would allow you to call FLEX utilities from within your program. Also you will now be able to force a variable to be allocated at a specific absolute memory location. This means that if you are lucky enough to have a memory mapped peripheral such as a video board, you will now be able to write your graphics applications in Pascal."

I would like to point out that there are many other applications where assigning a variable an absolute location is useful. For example, assign the Byte variable PORT to the address of a parallel output port. Now assigning a value to PORT writes a byte out to it. PORT := 7; writes out 0000111 to the port, etc. The port could for example, be controlling 8 solid state relays. This was a lack in standard Pascal. Lucidata, you've been reading my column for a lot of others thought this would facilitate using Pascal in the real world of control applications too.

Lucidata has moved. If you have their software and want to find them, their address is:

LUCIDATA Ltd. P.O. Box 128 Cambridge CB2 5EZ England

SPEAKING FORTH

My most prolific correspondent and developing "lineprinter pal" (could hardly say pen pal since we use our printers exclusively), Art Weller of El Paso TX recently purchased the FORTH Interest Group offerings of their Installation Manual and an Assembler source listing of an implementation of FORTH for the 6800. He typed in the source and got it running, and then managed to get me hooked on FORTH too. The 6800 version has only simulated disk memory, the disk drivers having been written for a non-FLEX disk system. Art asked if I would try to do the FLEX interface for the system.

Before launching into what follows, I must take a few paragraphs and describe FORTH very briefly. The FORTH "compiler" is a linked list of "WORDS". A word by any other name would have to be called a subroutine. When you use FORTH, you don't really generate a program that is separate and distinct from the "compiler". You essentially generate lists of subroutine jumps, and input or pass parameters to these subroutines by means of a "parameter stack". The compiler has a large "dictionary" of words that allow mathematical manipulations and I/O. To give a simple

example, the "application" that follows could be entered from the terminal 3 DUP *. This would execute immediately, and result in 9 being output to the terminal. 3 puts the number 3 on the parameter stack. DUP duplicates it and puts the duplicate on top of the stack. Now the number three appears twice on the stack as the top two items. * is the word for multiply, and it multiplies the top two items on the stack and leaves the result there. "." means print, and the item on the top of the stack is output to the terminal. If I want to multiply 17 and 22 I would use 17 22 *. and the answer would appear. Now suppose I am going to use the operation of squaring a number in my application. I can define a word called SQUARE as follows: SQUARE DUP *;. This is called a COLON definition. SQUARE is the name of the word. The ; ends the definition. This word is "compiled" and added to the dictionary. Now if I type in 3 SQUARE. I will get 9 as a result. The difference is somewhat like typing in a statement in BASIC with and without the line number. Without it (the colon) it is executed immediately, and with it, it is compiled for later execution. Compiling a group of such words produces a working application. FORTH is like Pascal in that each new definition must use only previously defined words, just as in Pascal, you can't call a procedure until it has been defined.

The peculiar notation that results from putting the "arguments" on the stack and then performing the operation, results in the backwards looking order of the statement. This is called postfix notation or "Reverse Polish" notation after the mathematician with whom its use was first associated. It's really closer to the way we do things manually than the more usual notation. When we add 17 and 22, we first write down 17, then below it 22, and then we draw a line and do the addition. Reverse Polish is the notation used by Hewlett Packard on all their calculators. Take the word of someone who has used both HP and other calculators, that it is much easier to use than the more normal algebraic notation with Multiply and Divide taking precedence over Add and Subtract.

I am going to put on my critical hat here for a few paragraphs. I have the Installation manual and the 6800 listing. Art supplied copies of both to me. I should mention here that the Installation manual contains the statement "Provided through the courtesy of the Forth Interest Group, P.O. Box 1105, San Carlos, CA. Further distribution of this public domain publication must include this notice." The 6800 source listing contains a similar notice. The Installation manual is \$10 directly from Fig, as is the 6800 source listing, which is about the cost of copying these two documents at the local Quick print shop. Whether you get these from Fig or from someone else who has them is a matter of expedience. After looking them over, I decided to buy the Fig. offerings, a book called Using FORTH (\$25) and the listing of the 6809 Implementation. (\$10). The 6809 version arrived and it was, to my extreme delight, written for FLEX and SWTPC system compatibility. I typed it in and my troubles began. The source is not really all that long, and the errors were few and easily found. The Installation manual, might as well have been written in Greek (and I consider myself a reasonably experienced programmer). The Fig. people are all too familiar with the language to be able to write anything understandable to someone not familiar with it. FORTH is quite unlike anything else I have ever seen in the way of languages.

This is not meant in any way to be critical of FORTH, only of the documentation. The book Using FORTH was a little help in that it does start by assuming that the user doesn't already know all about FORTH. Unfortunately it is a user manual (though generally written) for an Implementation called POLYFORTH, and many of the FORTH words described in it are not included in the Implementations supplied by Fig. (and vice versa). The source listing of the 6809

Implementation was written by R. J. Talbot Jr. of Talbot Microsystems, and it contains a notice that a more complete version with an editor and a complete Assembler are available from Talbot Microsystems. This listing contains a copyright notice and is not public domain, but at \$10 again, this just means that you must buy it from Fig. I must express some disappointment in the disk interface DOCUMENTATION again. There is a standard (for FORTH) disk interface that uses disk as a "virtual memory". Programs (or Applications as Fig calls them) are written into the disk memory by using an Editor written in FORTH. The Applications are edited into groups of 16 lines of up to 64 characters, called Screens, and written to the disk by Screen Number. They are retrieved from disk by LOADING those screens. The result is that the disk is very efficiently used. There is no space wasted for directories or for linking information. Each sector holds 256 bytes of information. The FORTH operating system takes care of the track and sector addressing of the disk to put the Screens where they belong by screen number. There is provision for linking a screen to the next, so that a long application may be loaded by LOADING the first screen.

If this looks messy, it is not really too bad. FORTH has a utility "word" called INDEX, which lists the first line of each screen over the range specified by you. Fig suggests that the first line of each screen contain a comment indicating the contents of that screen. Of course this wipes out the No overhead feature in that 64 bytes of each 1024 are used for identifying comments. There are some not so nice things about this system too. First of all, using a disk for FORTH SCREENS makes it totally FLEX incompatible. No command in FLEX may be used to read it (except for the EXAMINE utility in TSC's disk diagnostic programs). The disk of FORTH SCREENS may be placed in DRIVE 1 since you may specify the drive to FORTH. However, FORTH expects a couple of screens to contain error messages which it reads and outputs in case of an error. These screens in this implementation are Screens 40 and 41 but FORTH overrides the drive selected and looks at drive 0 for these messages. The FORTH.COMD file from which FORTH is loaded to memory, must of course be FLEX compatible, and therefore must be on a disk that does not contain SCREENS. I tried using drive 0 for the SCREEN disk and drive 1 for the FORTH.COMD disk, and FORTH will load from drive 1 but then it selects drive 0 looking for just what I am not sure, and not finding it, just hangs up. So, FORTH must be loaded from drive 0, and the SCREEN disk must be in drive 0. Any time you want to start over, (ie if FORTH goes west because you wrote a word wrong), and hit reset, you have to swap disks again. One possible way to get around this and still get error messages from the disk would be to figure out which sectors on drive 0 have to contain the error messages, and use the disk diagnostics utility to remove those sectors from the free chain on a newly formatted disk, then copy FORTH and any other utilities you may want onto that Flex compatible disk. Then you can read Screens 40 and 41 from the FORTH disk and select drive 0 and write them to screens 40 and 41 of the FLEX disk. (I tried this later and it works fine).

The Implementations supplied by Fig are reasonably complete and close to their "model" which is a source of FORTH written entirely in FORTH. This is only possible because FORTH allows imbedded Assembler code, and unfortunately, the imbedded Assembler code in the model is 6502 code. Though the 6809 implementation contains the disk interface, neither implementation includes the Editor which you must have to put information in the Screen or "block" buffer or to edit such information. The command 3 LIST, will place the contents of screen 3 from the disk into the buffer and list it to the terminal. You may then use the Editor commands to edit the screen or to enter data to be written to the disk. An editor is given in the FORTH model, and it fortunately contains very few words with

Imbedded machine code. You may enter the editor from the terminal, and then, having the editor, use it to edit itself into screens in a disk. The disk for FORTH Screens must be formatted using the FLEX NEWDISK command (which the manual never mentions). The editor may be entered skipping the machine code sections and a usable editor results. I plan on translating the machine code sections somehow later.

There are a few other unclear things that caused me a great deal of trouble in getting FORTH up. The Screens that hold the editor are rather full, and I copied them right out of the installation manual. When I input the editor, I got some error messages that led me to believe that I had done something wrong or had an error in my FORTH program. In FORTH, you may use what is called Context switching. You normally run in FORTH context when using FORTH. The Editor is entered using the EDITOR context, in which you may define words using the same names as words in FORTH. You simply type VOCABULARY EDITOR to define the Editor context, and DEFINITIONS to define words in that context. When I did this, each definition that used the same name as a word in the FORTH context gave me an error message, REDEF: <wordname> ERROR # 4 which I already knew. It turned out that these are just warning messages, and the words were accepted as part of the EDITOR vocabulary. The fact of these messages (no mention in the manual that they will appear and are to be ignored) cost me a long week of evenings trying to find out what was wrong. I in fact finally in desperation used the TSC EXAMINE utility to input the Editor screens to a disk. I used my old monitor MEX which allows direct entry of ASCII to memory, and then EXAMINE allows moving a block of data from memory to the disk sector buffer and writing it to a specified track and sector. I had figured out where some early Screens would be on the disk. Anyway after about 4 screens were entered that way, I tried using FORTH to list them and succeeded. I then tried loading them, and got the same error messages again. However, when I tried with little hope to use some of the editor commands I found that they worked, (the editor in the model was not the same as the one described in Using FORTH, and it took me several readings to figure out the meaning of the cryptic comments with each definition, but once I figured these out, I began to see how it worked.) I then was able to use the Editor to edit in the remainder of the editor, and found that it all would work.

Having gotten this far, I decided to try a simple word definition myself on a new block. There is an editor instruction CLEAR to fill a screen with spaces. I therefore cleared a block and entered a simple definition like: SQUARE DUP * ; which duplicates the top number on the stack and multiplies the two top numbers, returning the product on the stack. I had entered this from the terminal and tested it with " 3 SQUARE ." which should print the result to the terminal, and I got back 9. When I tried loading the screen with my definition, FORTH went west. About 10 computer hours later, I happened to think that when the block is read in there are about 14 lines of 64 spaces each below my definition. Perhaps the input buffer overflows because there are no CR's in those nice blank lines that list to the terminal just like the screens in the manual. I went back and put a CR on each blank line, and all worked fine. No mention of this in the manual either. I was further thrown off the track in this one because there were blank lines in the Editor screens, (but never 2 or more consecutively) that I had left filled with spaces.

Well by now you are beginning to get the picture. Every time I overcome a hurdle in getting FORTH up I run headlong into another. The problem is one of trying to learn the FORTH and implement FORTH, written in FORTH all at the same time. I haven't checked with Talbot yet, but I suppose for a few hundred dollars I can buy a working and complete FORTH implementation, and only have to struggle with learning the language. I

am too short on cash and too stubborn to do that yet. I will stick it out and get this up on my own. I'm not too far from that goal now. I don't think the Assembler is an absolute necessity. It is used to generate words in machine code. I think, though it has not been verified, that I can use hex codes to generate code words without the Assembler.

After a few further frustrations, I have been able to get my printer on line, and control it by using a couple of new words I defined, PON and POFF with obvious functions. I can now list my SCREENS to the printer and also use a utility word called INDEX to list the first (comment line) of each screen as an index sheet.

Again I would like to emphasize that my criticisms are all aimed at the documentation and not the language. FORTH is intriguing to say the least. The Prime Number program as reported in another column, only added 500 bytes to the dictionary, and may be written in 8 lines or so, while all the other languages required about a page of program. Perhaps when I've mastered this a little more, I will still remember what was most puzzling and I can write a "Beginner's Guide to FORTH".

Well, there you have in a nutshell what has been occupying my time for the past several weeks. I've been working on an interrupt driven input routine for FLEX that will allow you to type ahead of the command line. I have such a routine that works for terminal input that I've added to an editor to allow typing ahead while the screen updates, and it works fine. My first try at doing this for FLEX indicates that somewhere in the RENTER routine of FLEX, the interrupt mask is set so that interrupts are not effective. When I find this and figure out a way to disable it for versions of FLEX that may not have it quite in the same place, you will see it here. This seems to me to be a more sensible way to allow you to enter responses to prompts from FLEX than to have to have a special utility called Y and one called N to answer for you. Actually, if you've tried using Y with EDIT to answer the DELETE BACKUP? prompt, you have found a problem. Y will respond forever with Y, and the editor comes up waiting for a character. Result, infinite loop, hit reset quick! With typeahead capabilities, you put your single Y in the input buffer by typing it. When EDIT wants a character it gets the Y. If there is nothing else in the buffer, there is no response to the next prompt and it waits for you to enter a character. I haven't decided whether it would be better to echo the character on entry or when it is read by FLEX. I'll have to get it going and try both ways to see which seems better. The Editor in which I've put the modification, echoes when it gets around to picking up the characters in the buffer.

Perhaps I should explain a bit here. When FLEX is busy doing something, normally, it ignores anything typed on the keyboard. With an interrupt input routine, a key typed on the keyboard causes an IRQ interrupt to be generated. This goes to a routine that inputs the character and sticks it in a buffer of perhaps 32 characters. The input pointer is advanced for each character in the buffer. When FLEX asks for a character, the pointers are compared and if the input pointer is ahead of the output pointer, the character pointed at by the output pointer is returned to FLEX and the output pointer is advanced. The buffer is made "Circular" in that when either pointer is advanced past the end of the buffer area, it is reset to the beginning of the buffer. Thus, the operation is continuous and correct as long as the computer doesn't get more than one bufferful behind the terminal. FLEX normally will echo a character when it receives it, which is when it reads from the buffer, not when the character is input.

Well, that's about it for this month. Sorry, no listings this time. As I said, this has to be sort of "what's happening with me at the time" and I have

nothing profound in the way of generally interesting programs for you.

Ed's Note: Please see *↑FORTH*, a review by Dale Puckett, in the March '81 issue of *68 Micro Journal*. This will be especially interesting to those who do not desire to develop drivers and such.

DMW —

SPEED?

I would like to make several comments about the article "6809 Performance Timings" in the February 1981 issue of "68 Micro Journal". We enjoy seeing comparisons, such as those made by Mr. Moreira, especially when the 6809 comes out on top. However, one must be cautious when drawing conclusions from such comparisons. I would like to take issue with several of the points made in the article.

First of all, Mr. Moreira suggested that the TRS-80 BASIC uses the Z80 better than our BASIC uses the 6809. He is correct if 'better' means 'faster'. We feel that other factors, as well as speed, should be considered, especially with programs for the 6809. Our 6809 BASICs are written to be position independent (what the article references as 'autorelocating'), fully re-entrant, and ROMable. All three of these features are 'using' the 6809 to its fullest. If we would have wanted the fastest 6809 BASIC, we would not have made it position independent or re-entrant. As Mr. Moreira points out, programs which are position independent run slower, just as in his examples. The more variables a program has, the slower it will be. This can be seen by looking at the timings of two instructions. One is the 'LDD' direct, and the other is the 'LDD' indexed off of the stack.

Instruction	Cycles
LDD 0	5
LDD 0,u	5
LDD 10,u	6
LDD 20,u	6
LDD 200,u	9

The first instruction represents the direct case, while the others show three different indexed modes. Notice that the last instruction is almost twice as slow as the first! The assembler programs in the article had three variables which resulted in a maximum index value of four. Even in this case, Mr. Moreira experienced a 10% decrease in performance. BASIC, on the other hand, has over 500 bytes of variables located on the stack. This will certainly result in slower execution as compared to the same program placing the most frequently used variables in the direct page. It is our estimate, that if BASIC were rewritten, and not made re-entrant, position independent, or ROMable, it would run about 30% faster! This would not make full 'use' of the 6809!

Another part of the article compares a Pascal program against a BASIC program. The BASIC is doing all of its calculations in floating point while the Pascal is using integers. As far as that goes, comparing to the assembler versions is not really meaningful, since they also used integers. We ran the same program using our UNIFLEX BASIC which supports integer variables as well as floating point. The program looks as follows:

```
10 print "List of prime numbers."
20 print
30 print 1;2;3;
```

```
40 c1=0
50 n1=3
60 n1=n1+2
70 for k1=3 to n1/2 step k1-1
80 if n1/k1=k1-n1=0 then 120
90 next k1
100 print n1;
110 c1=c1+1
120 if n1<10000 then 60
130 print "c=";c1
140 end
```

This is identical to that presented in the article. Running the program on a SWTPC S/09 system and UNIFLEX produced a time of 1 hour and 10 minutes. This is almost twice as fast as the Pascal described.

The next step was to run the Pascal program under UNIFLEX Pascal. This Pascal is a native compiler which means it produces assembler code as output, instead of 'P-code' as most others. It is expected to produce faster running programs than the P-code systems. Our Pascal program ran in 34 minutes and 35 seconds. This is not much slower than the Z80 assembler program!

I realize that the intent of the article was to compare different systems and programming languages on various systems. It is interesting, however, to examine the algorithm. After all, the results are the important aspect, and the method of obtaining the results may vary significantly. The algorithm used in the article is an extremely poor way to find prime numbers. A more efficient algorithm, as presented by Niklaus Wirth, is shown below, written in Pascal.

{find the first 1229 primes}

```
const
  n=1229;
  n1=35; (n1 is sqrt of n)
var
  i,t,x,inc,lim,square,i: integer;
  prim: boolean;
  p,v: array[1..n] of integer;
begin
  write(2:6, 3:6); i:=2;
  x:=1; inc:=4; lim:=1; square:=9;
  for i:=3 to n do
    begin {find next prime}
      repeat x:=x+inc; inc:=6-inc;
        if square <= x then
          begin lim:=lim+1;
            v(lim):=square; square:=(p(lim+1))+p(lim+1)
          end;
        k:=2; prim:=true;
        while prim and (k<lim) do
          begin k:=k+1;
            if v[k] < x then v[k]:=v[k]+2*p[k];
              prim:=x < v[k]
            end
          until prim;
        if i <= n1 then p(i):=x;
          write(x:6); i:=i+1;
        if i=10 then
          begin writeLn; i:=0
            end
        end
```



```
end;
writein;
end.
```

This program is a little more complex than the one presented in the article, but it is still short and concise. This program will show just what can be done on a micro. The results will probably be quite surprising. Two versions of the program were run, one which printed the numbers as they were found, and one which did not. Running under UNIFLEX, the printing version took a total of 14.6 seconds while the non-printing one only took 3.6 seconds! This is quite a difference from the original timings of up to six and one half hours! Summarizing the results, we have the following:

Program and Processor	Time
TRS-80 Level II BASIC - Z80	6h 31min 10.0sec
Z80 assembler	22min 50.0sec
6809 TSC Floating Point BASIC	4h 17min 10.0sec
6809 Lucidata Pascal	2h 16min 0.0sec
6809 assembler - pos. indep.	6min 10.0sec
6809 assembler - direct	6min 10.0sec
IBM 370/148 assembler	56.0sec
6809 UNIFLEX BASIC	1h 10min 10.0sec
6809 UNIFLEX Pascal	34min 35.0sec
6809 UNIFLEX Pascal (better algor.)	14.6sec
6809 UNIFLEX Pascal (no print)	3.6sec

We hope everyone will continue to make comparisons of various types among the various processors and languages. Keep in mind, however, that things are not always as they appear, so be extra cautious when drawing conclusions from such experiments.

Dave Shirk, Technical Systems Consultants, Inc.



SWTC Southwest Technical Products Corporation
219 W. Rhapsody
San Antonio, Texas 78216
Feb. 6, 1981

Dear Dave,

You might be interested in publishing the enclosed benchmark. Dr. Martin said he did not mind if you gave him credit. Running on a 1.0 MHz Southwest Technical 6809 cryscon it took 147 seconds with standard TSC BASIC and 272 seconds with TSC extended BASIC.

The 6809 obviously stomps the TRS-80 and Apple and is only a third slower than the TI 9900 running FORTRAN. The 6809 should be very close to the V900 if it was also running FORTRAN.

Unlike the last benchmark you ran against an IBM 370/148, we did not look so good this time. This is probably a more reasonable comparison of number-crunching than the only integer benchmark you had before. Since no one ever claimed that a 6809 was supposed to be good at this type thing anyway, I cannot feel too bad.

D. Meyer

Dan

THE UNIVERSITY OF NEBRASKA-LINCOLN
LINCOLN, NEBRASKA 68583

DEPARTMENT OF
ENGINEERING MECHANICS

January 30, 1981

Daniel Meyer, President
Southwest Technical Products
219 W. Rhapsody
San Antonio, Texas 78216

Dear Mr. Meyer:

Listings of the BASIC and FORTRAN versions of our benchmark program are enclosed. In your letter of 27 January, you offered to run it on your 5/09 computer.

C. WAYNE MARTIN, Ph.D.
Professor of Engineering, Emeritus

Professor
University of Nebraska
Lincoln, NE 68583
(402) 475-8587

The objective of this benchmark program is to measure "number-crunching" speed in a type of calculation frequently required in structural engineering; enclosing any time required for I/O operations. The program requires input of a number, N, it then generates an Nth matrix and an analogous right-hand side for a set of N linear equations. The matrix is decomposed by the Choleski Square-Root method, and a solution is obtained for the N equations. If the program is working correctly, the results will always be the numbers 1,2,3,...,N.

The stop-watch should be started when the number N is input, and stopped when the computer begins to output results. Most of the results available so far are for 7 digit precision, FORTRAN, and N=50. Some times (not including compile or link-edit) for N=50 are:

Language	Computer	Time(sec.)
FORTRAN	IBM 370/148	2.36
FORTRAN	DEC LSI 11/03 with hardware floating point	18.9
FORTRAN	DEC PDP 11/34 without hardware floating point	40.8
FORTRAN	TI 9900	102
BASIC	TRS-80 Model I, Level II	1590
FORTRAN	TRS-80, Microsoft	591
BASIC	Apple II+	1101

We would like to know, as precisely as possible, the hardware and software used in your test. The 16 digit precision of your BASIC will probably cause it to run slower, and we will need to run some other tests at that precision to get an honest comparison. However, we do often need to do the calculation with 16 digit precision.

Your letter indicated that literature and prices on your systems were enclosed, but they were not. I hope they were sent under separate cover.

Thanks for your help.

Sincerely,

C. Wayne Martin
C. Wayne Martin
Professor of Engineering Mechanics

DM:1a

```

INTEGER I,J,K,K1,K2
DIM A(50,50),V(50),X(50)

INPUT M
XM=M

FOR I=1 TO M
  V(I)=1
NEXT I

FOR I=1 TO M
  FOR J=1 TO M
    A(I,J)=0.0
  NEXT J
NEXT I

FOR I=1 TO M
  FOR J=1 TO M
    A(I,J)=A(I,J)+1.0/(V(I)*V(J))
  NEXT J
NEXT I

FOR I=1 TO M
  A(I,I)=A(I,I)+1.0
NEXT I

FOR I=1 TO M
  V(I)=V(I)+XM/V(I)
NEXT I

GOSUB DCOMP
GOSUB SOLVE

FOR I=1 TO M
  SUM=V(I)
  K1=I-1
  IF I=1 THEN 8
  FOR K=1 TO K1
    SUM=SUM-A(K,I)*X(K)
  NEXT K

```

```

8  X(I)=SUM#A(I,I)
   NEXT I

   FOR I1=1 TO M
   I=M-I1+1
   SUM=X(I)
   K2=I+1
   IF I=K THEN I8
   FOR K=K2 TO M
   SUM=SUM-A(I,K)*X(K)
   NEXT K
18  X(I)=SUM#A(I,I)
   NEXT I1

   RETURN

#INTESER I,I1,J,K,K1,K2,M

DIM A(50,50),V(50),X(50)

INPUT M
XM=M

FOR I=1 TO M
V(I)=1
NEXT I

FOR I=1 TO M
FOR J=1 TO M
A(I,J)=0.0
NEXT J
NEXT I

FOR I=1 TO M
FOR J=1 TO M
A(I,J)=A(I,J)+1.0/(V(I)*V(J))
NEXT J
NEXT I

FOR I=1 TO M
A(I,I)=A(I,I)+1.0
NEXT I

FOR I=1 TO M
V(I)=V(I)*XM/V(I)
NEXT I

GOSUB DCOMP
GOSUB SOLVE

FOR I=1 TO M
PRINT X(I)
NEXT I

END

DCOMP
FOR I=1 TO M
FOR J=1 TO M
SUM=A(I,J)

```

```

K1=I-1
IF I=1 THEN I2

FOR K=1 TO K1
SUM=SUM-A(K,I)*A(K,J)
NEXT K

12  IF J<>I THEN I4
TEMP=1.0/SQR(SUM)
A(I,J)=TEMP
GOTO 20

14  A(I,J)=SUM*TEMP

20  NEXT J
NEXT I
RETURN

```

SOLVE

```

FOR I=1 TO M
SUM=V(I)
K1=I-1
IF I=1 THEN 8

FOR I1=1 TO K1
SUM=SUM-A(K,I1)*X(I1)
NEXT I1
8  X(I)=SUM#A(I,I)
NEXT I

FOR I1=1 TO M
I=M-I1+1
SUM=X(I)
K2=I+1
IF I=M THEN I8
FOR K=K2 TO M
SUM=SUM-A(I,K)*X(K)
NEXT K
18  X(I)=SUM#A(I,I)
NEXT I1

```

RETURN

```

220 IF I=1 GOTO 250
230 FOR K=1 TO K1
240 S=S-A(K,I)*A(K,J):NEXT K
250 IF J=I THEN GOTO 260 ELSE GOTO 280
260 T=1.0/SQR(S)
270 A(I,J)=T:GOTO 290
280 A(I,J)=S*T
290 NEXT J:NEXT I
300 RETURN
400 FOR I=1 TO M:S=V(I)
410 K1=I-1: IF I=1 THEN GOTO 430
420 FOR K=1 TO K1:S=S-A(K,I)*X(K):NEXT K
430 X(I)=S#A(I,I)
440 NEXT I
450 FOR M=1 TO M:I=M-M+1
460 S=X(I):K2=I+1
470 IF I=M THEN GOTO 490
480 FOR K=K2 TO M:S=S-A(I,K)*X(K):NEXT K
490 X(I)=S#A(I,I)
500 NEXT M
510 RETURN

```



```

10 DIM A(50,50),V(50),X(50)
20 REM DEFINIT I-M
30 INPUT M
40 XM=M
50 FOR I=1 TO M:V(I)=1:NEXT I
60 FOR I=1 TO M:FOR J=1 TO M:A(I,J)=0
70 NEXT J:NEXT I
80 FOR I=1 TO M:FOR J=1 TO M
90 A(I,J)=A(I,J)+1.0/(V(I)*V(J))
100 NEXT J:NEXT I
110 FOR I=1 TO M:A(I,I)=A(I,I)+1.0
120 V(I)=V(I)*XM/V(I):NEXT I
130 GOSUB 200
140 GOSUB 400
150 FOR I=1 TO M:PRINT X(I):NEXT I
160 END
200 FOR I=1 TO M:FOR J=1 TO M
210 S=A(I,J):K1=I-1

```

'09 BOOKS

We received two books this month that I feel are of importance to the 6809 user. One 'The MC6809 Cookbook' by an old friend and long time 68XX user and computer magazine editor, Carl Warren. Published by TAB Books. The other 'Microcomputer Architecture and Programming', by John Wakerly of Stanford University. Published by John Wiley and Sons.

The MC6809 Cookbook, by Carl Warren, is a complete description and reference source for those needing to know the many features of the 6809 microcomputer processor.

It should be of service to both the beginning programmer and seasoned code engineer. It covers the fundamentals of coding the 6809 and the basic skills for writing 6809 assembly language level programs. It also discusses other matters such as internal logic, comparison to the 6800, interfacing to other peripherals, software architecture, addressing methods and the 6809 instruction set. It concludes with pointers on how to build or make use of an existing 6809 system. In all 176 pages of vital information concerning the 6809.

A question arises, in my mind, as to the reasoning behind the examples given for software development and the actual computer used as illustration, in this book. The only actual microcomputer system looked at in this volume is the Motorola MEK6809D4, while a fine system and certainly well able to use the 6809, this unit does not compare, either in price or utility, with some of the other more popular 6809 systems. Mention is made of the additional modules and expansion kits necessary to bring this small system up to anywhere near what is readily available, from many other sources, for useful application of the 6809 CPU. Similar treatment is given the software mentioned, editor, assembler, EPROM programmer and other development facilities. Nowhere is there mention of the wealth of other 6809 hardware or software. The Standard S50 Bus is ignored!

Truly a short sighted approach, if the intent were to enlighten the reader as to the wide variety of hardware and software available. Also it is kinda interesting that this section in detailing the "NON-6809" system used in preparation of the text for this book was done on a Heath H-89 microcomputer, printed on an Epson printer, PIE editor and CP/M. Golly Carl, what happened?

All in all it is recommended reading and would be a fine addition to the 6809 programmer's tool kit. Reservations are made concerning the examples of soft/hardware, but no one is perfect.

The 'Microcomputer Architecture and Programming' is a rather large (670 plus pages) volume and was developed as a tutorial text reference. It covers other microprocessors DEC PDP-11, and LSI-11, Motorola 68000, Zilog Z8000, TI 9900, Intel 8086, Intel MCS-48 as well as the Motorola MC6809. The Motorola MC6809 is used in practically all examples of programming. However, the 6809 references are to a 'subset' of the full 6809 instruction set.

A large portion is devoted to programming in PASCAL, with references to other high level languages.

The text is sub-divided into sections and chapters, which allows an orderly progression from one instructional aspect to another. My initial impression is that this could be one of the more important 6809 reference books published today.

Our evaluation is based on advanced 'proof signatures' and a more complete review will be done when the final published volume becomes available. The author informed me that it should be available from the publisher soon. Hopefully by the time this gets to press. Will let you know. My initial impression is that this could be a must for practically any programmer using the MC6809.

Also arrangements are being made for portions of this book, concerning programming with routines and examples, to be available to 68 Micro Journal in the near future. I hope that we can run them as a short series. If they are anything like the book, it will be a valuable asset to any 6809 programmer.

Also of more than passing interest is the 'Acknowledgement' section of this book. The manuscript drafts were prepared on the author's personal computer system, which in part, consists of the following hardware and software. A SWTPC 6800 system with 48K of RAM. An SSB BFD-68 triple minifloppy disk system and DOS68 operating system. Also Tom Crosley's excellent PIE editor (soon a version for the 6809) and the text formatter used is Technical System Consultants (TSC) popular Text Processor. Right on, John!

DMW - - -

PIE

A "Real" Screen Editor for your "Dumb" Terminal!

by: Kenneth R. (Randy) Lewis
Ann Arbor Computer
Ann Arbor, Michigan 48104

For the past few months, we here at Ann Arbor Computer have had the opportunity to evaluate a radically different text editor. Let me qualify "Different" by saying, "It's nothing like the TSC standard text editor that we've all become accustomed to".

The new text editor I refer to is "PIE". "PIE" stands for "Programma Improved Editor" and was written by Tom Crosley of SOFTWEST Computer Consultants in California. PIE was originally written on the M6800 but due to marketing pressures, was re-written to run on the Z-80 and the 6502 micro-processors. Now with the popularity of the M6800 and M6809 on the rise, Mr. Crosley has decided to market his vastly improved text editor.

Distributed by Programma International in California, this new text editor takes advantage of "Cursor Control Functions" available in most of the video terminals being sold today. PIE provides the user with the Feel, Sensation, and Flexibility of a real "Screen" type text editor, but without the need for extra Video hardware and maybe a second keyboard!

Another nice feature of PIE is it's modular design. The editor is comprised of 3 "Working" sections, the "CORE" of the editor is first. The CORE provides all of the editor features (a

brief summary is listed at the end of this article), the second section - the "Screen I/O", does the magic to your "DUMB" or better terminal, and finally the "FLEX I/O" section gives the editor the kind of pzazz!! only dreamed of in the past. It is the "Screen I/O" section that the user can adapt to practically any video terminal that operates at at least 9600 baud and has a "Screen Clear" and "Cursor Position" control sequence!

If it sounds like I'm wild about PIE, you're absolutely right! It's a pleasure to use. The screen control functions are well-thought-out, conveniently placed, and work smoothly. There are three basic modes of operation in PIE. The first and most generally used is the standard "Screen" entry mode. Column number and Line number are maintained on a "Editor Status Line" at the very bottom of the screen! The user need only type away happily and PIE does the rest. Inserting lines are a "Snap". "Deleting" lines too! Positioning the Cursor is easy with 11+ commands like-Up,Down,Left,Tab-Left,Right,Tab-Right,Space,Back-Space, Append,etc. PIE has all of the usual features too, like "Goto" any line or Top or Bottom. "Search" for any string. "Change" an occurrence or all occurrences of a string to something else. The list is too numerous to expand on here.

The second mode of operation is called "Auto-Indent" mode. This mode allows the "Programmer" to blast away at "Program" text, such as assembly or SPL/M type text without having to fiddle around putting a bunch of "Spaces" here and there to have the source code look "Structured". PIE keeps up with the starting position on each line of text and politely positions the cursor under that position after a carriage return is entered for the previous line. The user need only space left or right "One" position to continue with that wonderful programming art form called "Indentation"! Auto-Indent mode also moves existing text "down" in a file if you are inserting lines, a very nice touch.

The third mode, and the one I'm using right now is "Paragraph" entry mode. This form controls the text entry for the user and automatically "Wraps Around" text lines at a pre-determined, but user changeable point on the screen. Don't worry though, PIE won't split some nifty word you are typing, it waits for a space and then, if required, swipes that word and places it at the beginning of the next line! If you touch type (I don't) this feature is especially nice because you don't really have to look at the screen and decide when to hit a carriage return, PIE does it for you! Just type away and PIE takes care of roughing the text into Paragraphs.

If all of this sounds nice so far, there's more.... PIE takes full advantage of the "FLEX" disk operating system and allows for some pretty powerful disk functions. PIE lets you "Read"

and "Write" to "SIDE" files and place them anywhere you want in the text you are editing. Any number of Side Files are allowed and "Line Ranges" are allowed so you have precise control over the "ins and outs" of what's being written or read! PIE, like some other editors allows for editing files that are larger available memory, and also files that span more than one disk! PIE performs all commands with simple "Keystrokes"! You don't have to get out of "Edit" mode to do some type of editor command, just push the appropriate control key and "Zap!", it's done!

PIE is available on 5 1/4" disk for "FLEX" and comes with a very complete (over 100 pages) users manual with excellent examples and a very good tutorial on the essential editor features. There is even a "Sample" file to go with the tutorial to get you started. The PIE editor is easy to learn, fun to use, and very, very powerful! The price? \$79.95 (well worth it!)

PIE can be ordered from:

Programma International
3400 Wilshire Boulevard
Los Angeles, California 90010

PIE is also available for the "Apple" computer and for some Z-80 systems (a tribute to it's power and flexibility!). These versions optionally include a "built in" text formatter. Contact Programma International for details on any of their 6800/6809 products.

PIE uses "Control" key functions to implement the following commands, space does not permit a full description of each or all of the editor functions but I will try to do it justice..

Cursor movement includes..up,down,left tab,right tab,home to top, home to bottom,append,left justify, and carriage return (some of these and some of the following commands toggle a function on and off!).

Page Scrolling functions include..down page,down 'nn' lines,up page,up 'nn' lines,screen up 1/3 page,screen up 'nn' lines,screen down 1/3 page,screen down 'nn' lines, and "Home" line.

Goto...goto top,goto bottom,goto line 'nn',and goto column 'nn'.

Character Editing....character insert mode,backspace, and gobble.

Inserting and Deleting lines...insert 1 line,insert 'nn' lines, delete current line,delete 'nn' lines,delete lines 'nn' through

'mm', delete blank lines, and delete to end of line.

Copying and Moving Lines....push 1 line,push 'nn' lines,pop lines, push-delete current line,push-delete 'nn' lines, and move lines 'nn'-'mm'(some of the above commands and some that follow, can also use the cursor and cursor movement control to define the line or character range that is being manipulated!).

Shifting of Text...shift right,shift left,shift blanks left, split line, and join lines.

String Search....search forward for 'ss',search forward again, search backward for 'ss', and search backward again from present position in text.

Insert and Replace Text....insert string 'ss', and insert string again(ueful for adding text at random places in file!), replace search string with 'as',replace 's1' with 'a2',replace again,global replace 's1' with 's2'.

As mentioned in the article, Paragraph mode and Auto-Indent modea(toggled).

Shift Lock (UPPER/lower case).

Generate "Control Character"

Setting Tabs and Bell Column....set tab at current column, clear tab at current column,set tabs every 'nn' columns,clear all tabs,set bell column, and clear bell column.

Exit and Save file,Quit (no save),Save-delete backup and exit, Save then edit new file, edit New text in same file, edit next buffer and write old text. Write "Side" file,write "Side" file then delete lines 'nn'-'mm',read "Side" file (range also controllable).

DISKEDIT

*** This document hereby grants permission for a modified version of DISKEDIT to be published in the 68 MICRO Journal provided correct notification of the original author and the actual sections modified are listed. It does not abridge the copyright in any other respect ***

Lawrence F. Strickland

Diskedit is a FLEX utility that is written to provide the user with the ability to edit the data on a diskette irrespective of the file structure that exists on the diskette. A description of the features of this utility and how to access those features follows.

This utility was originally written by Lawrence Strickland, an Instructor at St. Pete Jr. College. However, it was modified from FLEX2.0 to FLEX9 by Allen Clark, a senior hardware design engineer, to provide relocatability, a help menu, auto cursor positioning in the modify mode, automatic adjustment for disk size, and the ability to search for a string. Comments regarding useability and suggestions for enhancements would be appreciated. Since this utility makes use of the programmable features of the SWTPCo CT-82 terminal it is only compatible with that terminal or the new 8212 or 8209 terminals from SWTPCo. However, the program automatically adjusts itself to track/sector structure of the users disk system and therefore it will work with small or large disks.

The command file is executed like any standard FLEX command file and since the program is fully re-locatable, it may be loaded wherever the user desires with the RUN command. For example entering...

RUN,4FOC 0,DISKEDIT,CMD

("0" and "CMD" optional)

On the FLEX command line will load the file at location \$4FOC and then prompt for the number of the disk drive that contains the diskette that the user wishes to edit. Entering the drive number will cause the CT-82 terminal to display a HEX/ASCII dump of track 0, sector 3 and the disk directory information. In addition the message "HELP = ?" is displayed. This message is intended as a prompt to the user to remind him that entering a "?" (question mark) will provide him with a command prompting menu in case he does not know the available options and their command keys.

At this point the operator may enter a command or a "?". If the operator enters a question mark the following menu will be displayed.

- B. AUTO-LINK BACK TO PREVIOUS TRACK/SECTOR
- D. GET NEW DRIVE #
- E. EXIT TO FLEX
- F. AUTO-LINK FORWARD TO NEXT TRACK/SECTOR
- M. MODIFY CURRENT SECTOR
 - <. STEP BACK THRU SECTOR
 - >. STEP AHEAD THRU SECTOR
- (HOME). SET BYTE POSITION
 - v. SELECT HEX DATA ENTRY MODE
 - φ. SELECT ASCII DATA ENTRY MODE
- (ESC). TOGGLE HEX/ASCII MODE
- S. SEARCH FOR HEX/ASCII STRING ON DISK
- T. SPECIFY NEW TRACK/SECTOR
- Z. ZERO CURRENT TRACK/SECTOR
- >. FORWARD TO NEXT SEQUENTIAL TRACK/SECTOR
- <. BACKWARD TO LAST SEQUENTIAL TRACK/SECTOR

From this point the user may select any of the above commands and enter the single key that defines that command.

Once the editing session begins the user may access the disk sector(s) to be edited in several modes. If the user does not know the track/sector location of the data to be altered he may enter "S" for search and then using the up-arrow, down-arrow, or "ESC" keys select the HEXADECIMAL or ASCII data entry mode. The user may now enter the string to be located in

Intermixed HEX and or ASCII followed by a carriage return. The system will then report all track/sector occurrences of the user defined string. Once the user knows the track/sector locations he may use the "T" command which prompts for the track and sector the operator wishes displayed to the CRT in HEX and ASCII. Alternately the user may use the right or left arrow keys to step forward or backward to the desired track sector, or he may use the "F" or "B" keys to step forward or backward through a file (the program uses the sector linkage bytes at the beginning of each sector to determine which linked sector to display next). Note, because the linkage structure is saved on a linkage stack by the utility while stepping forward with the "F" command the "B" command is limited to accessing only those linked sectors that have been previously accessed with the "F" command.

Once the sector is accessed (displayed on the CRT) the user may enter the "M" (modify mode) and alter the data for that sector. Note that the user may use the cursor keypad arrows to select the specific byte position he wishes to alter. At this point he simply enters the data in the format he selected for entry (HEX or ASCII). The cursor will then automatically position itself to the next byte position. Since the data is handled in a buffered entry mode the user may make as many changes to the displayed sector as he so chooses before entering a carriage return to exit the modify mode. At this point the user will be queried as to whether or not he desires the modified sector to be written to the disk. A response of NO will leave the sector un-altered on the disk and the system will await a new command.

This utility is very friendly to the user and once he becomes familiar with it he will see that its usefulness extends from the recovery of crashed disks all the way to the creation of unique disk structures for custom applications.

BY: Allen Clark

2502 Regal Oaks Ln
Lutz, FL 33549

DISKEDIT 2-9-81 5:09 PM ITSC1 PAGE 1

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4
5 DISKEDIT ALLOWS DISPLAY AND MODIFICATION OF ANY
6 TRACK/SECTOR ON THE DISK TO A CT-82 TERMINAL.
7
8
9 CALLING SEQUENCE: DISKEDIT (LOADS AT 00100)
10 # OR: RUN,0131,DISKEDIT (LOADS AT 41111)
11
12 #COMPROM:
13 # D. LINK BACK TO PREVIOUS TRACK/SECTOR
14 # E. GET NEW DRIVE #
15 # E. EXIT TO FLEX
16 # F. AUTO-LINK FORWARD TO NEXT TRACK/SECTOR
17 # R. MODIFY CURRENT SECTOR
18 # S. SEARCH FOR HEX/ASCII STRING ON DISK
19 # T. GET NEW TRACK/SECTOR
20 # Z. ZOOM CURRENT TRACK/SECTOR
21 # . FORWARD TO NEXT SEC. TRACK/SECTOR
22 # . BACKWARD TO LAST SEC. TRACK/SECTOR
23
24 # FLEX2.0 ORIGINAL COPYRIGHT 1980
25
26 # LAWRENCE STRICKLAND
27 # 9490 1816 LANE NORTH
28 # GERMINGHAM, FLA. 33542
29 # (813)-397-2041
30
31 # MODIFIED FOR FLEX10: 29 DEC 80
32
33 # ALLEN CLARK
34 # 2502 REGAL OAKS LANE
35 # LUTZ, FLA. 33549
36 # (813)-977-0347

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0000	FCD	EDU	0000	
0001	NASH	EDU	0001	WORKING DRIVE
0002	LSTRM	EDU	0002	LAST TERMINATOR
0003	LOWP	EDU	0003	LINE BUFFER POINTER
0004	MEMEM	EDU	0004	MEMORY END
0005	NAME	EDU	0005	
0006	INCH	EDU	0006	INPUT CHAR
0007	GETCH	EDU	0007	GET CHARACTER
0008	PATCH	EDU	0008	
0009	INBUF	EDU	0009	FILE INPUT BUFFER
0010	PCRLF	EDU	0010	PRINT CARriage Rtn / LINE FEED
0011	REPORT	EDU	0011	REPORT ERROR
0012	GETCH	EDU	0012	GET HEX CHARACTER
0013	FRMCL	EDU	0013	
0014	FMS	EDU	0014	
0015	DRYMR	EDU	0015	DISK DRIVE NUMBER
0016	CTRACK	EDU	0016	CURRENT TRACK IN FCD
0017	CSECT	EDU	0017	CURRENT SECTOR IN FCD
0018	SECTOR	EDU	0018	START OF SECTOR BUFFER IN FCD
0019	DSK17	EDU	0019	MAXIMUM TRX/SECT 0

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0010	HOME	EDU	010	HOMEUP
0011	SETC	EDU	008	SET CURSOR POSITION (X,Y)
0012	EROL	EDU	006	ERASE TO END OF LINE
0013	CR12	EDU	012	CRT FORMAT 11 - 20 LINES LARGE CHAR
0014	FF	EDU	00C	
0015	ERFPM	EDU	016	ERASE TO END OF FRAME
0016	WPRC	EDU	016	WRITE PROTECTED CHARACTERS
0017	WUPRC	EDU	006	WRITE UNPROTECTED CHARACTERS
0018	WUPRC	EDU	017	WRITE CHARACTER PROTECT
0019	WUPRC	EDU	007	WRITE CHARACTER PROTECT
0020	DISHE	EDU	018	DISPLAY BYTE IN HEX
0021	WUPRC	EDU	004	WUP CURSOR LEFT
0022	WUPRC	EDU	009	WUP CURSOR RIGHT
0023	ESC	EDU	010	ESCAPE KEY
0024	GRG	EDU	01C	GROUP B LEADIN
0025	GRG	EDU	01D	GROUP C LEADIN
0026	GRG	EDU	01E	GROUP E LEADIN
0027	GRG	EDU	01F	
0028	GRG	EDU	020	
0029	GRG	EDU	021	
0030	GRG	EDU	022	
0031	GRG	EDU	023	
0032	GRG	EDU	024	
0033	GRG	EDU	025	
0034	GRG	EDU	026	
0035	GRG	EDU	027	
0036	GRG	EDU	028	
0037	GRG	EDU	029	
0038	GRG	EDU	030	
0039	GRG	EDU	031	
0040	GRG	EDU	032	
0041	GRG	EDU	033	
0042	GRG	EDU	034	
0043	GRG	EDU	035	
0044	GRG	EDU	036	
0045	GRG	EDU	037	
0046	GRG	EDU	038	
0047	GRG	EDU	039	
0048	GRG	EDU	040	
0049	GRG	EDU	041	
0050	GRG	EDU	042	
0051	GRG	EDU	043	
0052	GRG	EDU	044	
0053	GRG	EDU	045	
0054	GRG	EDU	046	
0055	GRG	EDU	047	
0056	GRG	EDU	048	
0057	GRG	EDU	049	
0058	GRG	EDU	050	
0059	GRG	EDU	051	
0060	GRG	EDU	052	
0061	GRG	EDU	053	
0062	GRG	EDU	054	
0063	GRG	EDU	055	
0064	GRG	EDU	056	
0065	GRG	EDU	057	
0066	GRG	EDU	058	
0067	GRG	EDU	059	
0068	GRG	EDU	060	
0069	GRG	EDU	061	
0070	GRG	EDU	062	
0071	GRG	EDU	063	
0072	GRG	EDU	064	
0073	GRG	EDU	065	
0074	GRG	EDU	066	
0075	GRG	EDU	067	
0076	GRG	EDU	068	
0077	GRG	EDU	069	
0078	GRG	EDU	070	
0079	GRG	EDU	071	
0080	GRG	EDU	072	
0081	GRG	EDU	073	
0082	GRG	EDU	074	
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0084	GRG	EDU	076	
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0096	GRG	EDU	088	
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0098	GRG	EDU	090	
0099	GRG	EDU	091	
0100	GRG	EDU	092	
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0115	GRG	EDU	107	
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0135	GRG	EDU	127	
0136	GRG	EDU	128	
0137	GRG	EDU	129	
0138	GRG	EDU	130	
0139	GRG	EDU	131	
0140	GRG	EDU	132	
0141	GRG	EDU	133	
0142	GRG	EDU	134	
0143	GRG	EDU	135	
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129 0125 30 80 07EF LEAR RESERV,PCR POINT TO DRIVE MSG
130 0129 17 01E2 LBSR MBRV PROMPT FOR DRIVE 0
131 012C 06 CC13 LBA LSTION GET LAST TERMINATOR
132 012F A7 40 STA LSTSV,U AND SAME 11
133 0131 20 1F BBA REDSEC
134 0133 30 80 040A TRXSEC LEAR TRACKR,PCR TRACK 0 MSG
135 0137 17 020C LBSR PSTRN OUTPUT 11
136 013A 00 C010 JSR JUMPOFF GET THE TRACK 0
137 013D 00 C042 JSR DETHE1
138 0140 25 40 BCS ILG1 ILLEGAL TRACK SPECIFIED
139 0142 3F 10 YFO 0,0
140 0144 01 C4 CMA METRG,U
141 0146 22 05 BDI ILG1
142 0148 E1 41 CMA MISEC,U
143 014A 22 41 BME ILG1
144 014C 50 TST0
145 014D 27 3E BEB ILG1 NO SECTOR 0
146 014F 0F C05E STI CYANOR
147
148 1 READ SECTOR INFO FOR AREA AND
149 1 DISPLAY SECTOR IN HEX AND ASCII
150
151 0152 30 80 059C REDSEC LEAR FRAME,PCR INITIAL SCREEN
152 0154 17 01E0 LBSR PSTRN OUTPUT 11
153 0159 17 0205 LBSR OUTION OUTPUT DISK HEADER INFO
154 015C 00 09 PSR SHWSEC
155 015E 17 01F4 LBSR CLWMSG CLEAR THE MESSAGE AREA
156 0161 00 19 PSR GMS
157 0163 00 67 PSR DISPSC DISPLAY SECTOR
158 0165 20 77 BBA CMMO
159 0167 30 80 0679 SHWSEC LEAR DR/POS,PCR
160 016B 17 01F1 LBSR SET SET CURSOR TO DRIVE 0 POSITION
161 016E F6 C043 LBA BDRVON DET DRIVE 0
162 0171 17 01FE LBSR PRIME1 AND PRINT IN HEX
163 0174 FC C05E LBA CLWMSG TRX/SEC 0 INFO "0"
164 0177 30 80 0667 LEAR SPOS,PCR SECTOR POSITION
165 017D 17 01E3 LBSR SET SET CURSOR TO SECTOR 0 POSITION
166 017E 17 01F1 LBSR PRIME1 PRINT SECTOR IN HEX
167 0181 30 80 0650 LEAR TPOS,PCR TRACK POSITION
168 0185 17 0107 LBSR SET SET CURSOR TO TRACK 0 POSITION
169 018D 1F 09 YFO 0,0
170 018A 16 01E5 LBA PRIME1 PRINT TRACK IN HEX
171
172 018D 30 80 0660 ILG1 LEAR ILWMSG,PCR
173 0191 17 01C1 PRIME1 LBSR CLWMSG
174 0194 17 014F LBSR PSTRN
175 0197 00 C015 JSR GETCHP
176 019A 20 12 BBA CMMO
177
178 019C 34 12 BMS PSMS A,1
179 019E 0C C040 LDI 0,0 READ SINGLE SECTOR
180 01A1 06 09 LBA 0,0 FROM CURRENT TRACK/SECTOR
181 01A3 A7 04 STA 0,1 POINT IN PCB
182 01A5 00 0406 JSR FMS
183 01A8 27 1C BEB BMSR NO ERROR, THEN DISPLAY
184 01AA 34 14 PSMD B,1 SAVE HARD ERR 0 & PCB POINTER
185 01AC 30 80 0636 LEAR ROEMR,PCR ELSE SOME HARDWARE ERROR
186 01B0 17 0193 LBSR PSTRN PRINT MSG HEADER
187 01B3 35 14 PULS B,1
188 01B5 17 01BA LBSR PRIME1 PRINT ERROR 0 IN HEX
189 01B8 30 80 0647 LEAR ROEMR2,PCR AND TRAILER MSG
190 01C0 17 0107 LBSR PSTRN
191 01C2 01 C015 JSR DETCHM CONTINUE ?
192 01C4 01 59 CMA 0,1 YES
193 01C6 26 02 BME GOCHMD NO, DET NEW COMMAND
194 01CA 35 92 GCHMD LEAS A,1,PC
195 01CC 32 45 GCHMD LEAS 5,5 ADJ STACK
196 01CA 20 12 BBA CMMO
197
198 01CC 4F 4F DISPSC CLR BYTEND,U SET FOR BYTE 00
199 01CE 4F CLRA LILENISE ACCA
200 01CF 17 010F LBSR DSPBYT DISPLAY BYTE 00
201 01D2 4C 4F INC BYTEND,U DO NEXT BYTE
202 01D4 46 4F LBA BYTEND,U GET IT
203 01D6 26 01 BME DISP1 BACK TO BYTE 0?
204 01D8 39 RTS
205 01D9 17 0105 DISP1 LBSR DSPBYT DISPLAY IN HEX AND ASCII
206 01DC 20 F4 BBA DISP0 NO, DO NEXT BYTE
207
208 1 COMMAND PROCESSING
209
210 01DE 06 C0 2C CMMO LBA MLCMD,U
211 01E1 26 0A BME CMMO
212 01E3 30 80 0641 LEAR CONST,PCR OUTPUT COMMAND STRING
213 01E7 17 019C LBSR PSTRN
214 01EA 00 C015 JSR DETCHM
215 01ED 17 01A3 CMMO LBSR CLWMSG CLEAR MESSAGE AREA
216 01F0 30 80 0641 LEAR CONTRL-3,PCR COMMAND TABLE ADDRESS
217 01F4 30 03 CMMO LEAR 3,1
218 01FA 60 04 TST 0,1 IS IT END OF TABLE ?
219 01FB 27 E4 BEB CMMO IF END, NO MATCH IN TABLE
220 01FA A1 80 CMA 0,1 NO, CHECK FOR MATCH
221 01FC 26 F6 BME CMMO FOUND MATCH IN TABLE
222 01FE 4F C0 2C CLR MLCMD,U
223 0201 6E 04 JMP 0,1 GO EXECUTE IT
224
225 1 AUTO-LINK TO NEXT TRACK/SECTOR
226
227 0203 FC C000 LINK LBA SECTION GET TRACK 0 FROM SECTOR BUFFER
228 0206 27 13 BEB MCLINK
229 0208 06 46 LDI STACK,U
230 020A 0C 44 CMA SIKROT,U
231 020C 23 14 BLS STKFUL STACK FULL ?
232 020E FC C05E LBA CTRACK
233 0211 E0 03 STI 0,1 PUSH LINKED TRX/SEC ON STACK
234 0213 0F 46 STI STACK,U
235 0215 FC C000 LBA SECTION
236 0218 16 02EA LBA DIST5 DISPLAY SECTOR
237 021B 30 80 0666 MCLINK LEAR LINKRS,PCR
238 021F 16 FF6F LBA PRIME1
239 0222 30 80 1A3F STKFUL LEAR TOPSIX,PCR
240 0226 0F 46 STI STACK,U SCRVSD STACK
241 0228 20 04 BBA CMMO
242
243 022A E6 4F A01 LBA BYTEND,U DET BYTE NUMBER FOR OFFSET
244 022C 0E C000 LDI 0,SECTION START OF BUFFER
245 022F 3A 46 BDI 0,1 ADD IN OFFSET
246 0230 39 RTS
247
248 0231 34 02 BWPCH PSMS A
249 0233 06 04 LBA 0,0MPCRL BUMP CURSOR LEFT
250 0235 17 02E9 LBSR PUTCH2
251 0238 35 02 PULS A,PC
252
253 1 MODIFY CURRENT SECTOR
254
255 023A 0F 0E MODIFY CLR MODE,U SET TO HEX MODIFY
256 023C 0F 4F CLR BYTEND,U SET TO BYTE 00
257 023E 30 80 0630 LEAR ROMMR,PCR OUTPUT HEADER
258 0242 17 0101 LBSR PSTRN
259 0245 E6 46 MODO LBA BYTEND,U DET BYTE NUMBER
260 0247 30 80 064E LEAR POSPOS,PCR POSITION LOCATION
261 0249 17 0111 LBSR SET
262 024E 17 0121 LBSR PRIME1 PRINT POSITION IN HEX
263 0251 30 80 0640 LEAR HELPOS,PCR NOW MOVE TO HEX VALUE
264 0255 17 0107 LBSR SET
265 0258 00 04 BDI 0,1
266 025A E6 04 LBA 0,1 DET BYTE IN QUESTION
267 025C 17 0113 LBSR PRIME1 AND PRINT IT
268 025F 30 80 063A LEAR MSCPOS,PCR NOW TO ASCII POSITION
269 0263 17 00F9 LBSR SET
270 0266 1F 90 YFO B,A
271 0268 17 0134 LBSR PRIME1 AND PRINT IN ASCII
272 026B 60 0E MCLASC MODIFY IN HEX OR ASCII
273
274 026D 26 10 BME ASCMD IN ASCII IF (> 0)
275 026F 17 0113 MCLMOD LBSR 0,1
276 0272 00 30 BDI 0,1
277 0274 00 30 BDI 0,1
278 0276 17 020E LBSR INHE1 GET THE HEX VALUE
279 0279 25 10 BCS HE1CTL NOT HEX, MAYBE CONTROL ?
280 027B 00 AD BOMOD BDI 0,1
281 027D 07 04 STA 0,1 PUT IN SECTOR BUFFER
282 027F 06 FF LBA 0,0
283 0281 A7 40 STA MOD,U SET SECTOR
284 0283 06 4F LBA BYTEND,U SET THE BYTE NUMBER
285 0285 17 0129 LBSR DSPBY1 AND DISPLAY CHANGED BYTE ON SCREEN
286 0288 6C 0F INC BYTEND,U MOVE TO NEXT BYTE
287 028A 20 09 BBA MODO AND DO IT
288 028C 17 0122 ASCMOD LBSR DSPBY2
289 028F 00 40 BDI 0,1
290 0291 00 C015 JSR DETCHM GET THE CHM
291 0294 01 1F CMA 0,1 CONTROL CHM ?
292 0296 22 E3 BDI 0,1
293 0298 34 02 MCLCTL PSMS A
294 029A 46 4F LBA BYTEND,U
295 029C 17 0112 LBSR DSPBY1
296 029F 35 02 PULS A
297 02A1 01 00 CMA 0,0 CARRIAGE RTN ?
298 02A3 27 20 BEB MCLCTL YES, EDIT MODIFY
299 02A5 01 10 CMA 0,10 "ESC" ?
300 02A7 26 04 BME RTGS
301 02A9 63 0E CMA MODE,U TOGGLE MODIFY FORMAT FLAG
302 02AB 20 0E BBA MCLASC
303 02AD 01 09 MCLMOD CMA 0,0MPCRL CURSOR RIGHT ?
304 02AF 27 07 BEB BWPCH BUMP FORWARD
305 02B1 01 07 CMA 0,2 CURSOR DOWN ?
306 02B3 27 0E BEB LONE1 YES, HEX MODIFY NOW
307 02B5 01 01 CMA 0,1 CURSOR UP ?
308 02B7 27 0E BEB 10ASC YES, ASCII MODIFY FROM NOW ON
309 02B9 01 04 CMA 0,0MPCRL CURSOR LEFT ?
310 02BB 27 43 BEB BWPCH BUMP BACKWARDS

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310 0200 01 10      CWP4 0010  HOME ?
311 020F 27 7F      DE0  MODPOS  MODIFY POSITION
312 02C1 20 02      00A  MOD0  IGNORE ANYTHING ELSE
313 02C3 4F 4E      TONEZ CLR  HOME,U  SET FOR MODIFY+ME1
314 02C5 20 00      00A  ME100  AND DO IT
315 02C7 06 0F      T0ABE LBA  DIFF  SET FOR MODIFY+ASC11
316 02C9 07 4E      01A  HOME,U
317 02CB 20 0F      00A  ASC000  AND DO IT
318 02CD 17 0005  HOME11 L000  CLAND00  ERASE FIRST TWO LINES
319 0200 00 00      REW1TE T01  ADD,U  HAS SECTOR BEEN ALTERED ?
320 0202 27 19      DE0  REW1T  YES, REWRITE
321 0204 0F 00      CLR  MOD,U  SET NOT MODIFIED ANYMORE
322 0206 30 00 03CC LEA1  REW1T0,PCR  SHOULD WE RE-WRITE ?
323 020A 00 0A      DE0  PST00  YES
324 020C 00 0015  J0R  REW1T0  GET THE MESSAGE
325 020F 01 39      CWP4 01Y  WELL ???
326 0211 2A 0A      01E  REW1T0  NO, JUST RETURN
327 0213 0E 00A0  L01  0FC0  YES, WRITE SINGLE SECTOR
328 0216 0A 0A      LBA  010  POINTED TO BY CURRENT?
329 0218 07 0A      01A  011  POSITION BYTES
330 021A 00 0A06  J0R  FMS  IGNORE ANY WRITE ERRORS
331 021D 16 FECE  REW1T L00A  C000  NOW DO ANOTHER COMMAND
332 021F 30 00 05A5  MODPOS LEA1  POSPOS,PCR  POSITION TO LOCATION
333 0224 00 0F      DE0  SET
334 0226 17 010E  L00R  IME1  GET ME1 VALUE FOR NEW POSITION
335 0229 25 90      DE0  ME1CT  NON-ME1, MAYBE CONTROL ?
336 022B 07 4F      01A  BYTEND,U  SAVE NEW ME1 POSITION
337 022D 16 FF45  L00A  MOD0  AND DO DISPLAY IT
338 0230 0A 4F      JUMP0 DE0  BYTEND,U  BACKUP ONE BYTE
339 0232 16 FF00  L00A  MOD0
340
341      I REW0V -- GET A NEW DRIVE 0
342
343 0305 30 00 032C  REW0V LEA1  REW0V,PCR
344 0309 00 03      DE0  REW0V
345 030B 16 FE44  L00A  RE00C  AND DISPLAY THE DRIVE 0
346 030E 00 3A      DE0  PST00
347 0310 00 0010  J0R  REW0V  GET THE DRIVE 0
348 0313 00 0042  J0R  0E10E1  NOW EXTRACT IT
349 0316 25 00      DE0  REW0V  IF ILLEGAL 0, TRY AGAIN
350 0318 1F 10      1FR  1,0
351 031A 04 03      0000 03  MASK TO 0-3
352 031C 07 00A3  ST0  000000  POSE DRV 0 IN FCB
353 031F 0C 0003  L00  03  16 0, SEC 3 SYS INFO SECTOR
354 0322 00 000E  ST0  C10ACK
355 0325 17 FE74  L00D  GAS  00 SYS INFO FROM SELECTED DRV
356 0328 0C 00A6  L00  00R012  FETCH DISK SIZE
357 032B 00 04      ST0  ME10E,U
358 032D 20 20      00A  CLAND00  CLEAN THE MESSAGE AREA
359
360      I PREV -- GET PREVIOUS TRACK/SECTOR
361
362 032F 0E 46      PREV L01  STACK,U  GET STACK POINTER
363 0331 0C 42      CWP1  ST00P,U  ARE WE AT THE BEGINNING ?
364 0333 27 0A      DE0  PRV1T5  YES, IGNORE BACKUP
365 0335 0C 01      L00  0,1+  THEN BACK UP ONE FRAME
366 0337 0F 46      011  STACK,U  SAVE STACK POINTER
367 0339 16 01C9  L00A  D10T5
368 033C 16 FE9F  L00A  C000
369 033F 30 00 0000  PRV1T5 LEA1  S100,PCR
370 0343 16 FE40  L00A  PR1GE1
371
372      0PST00 - PRINT STRING-NO RETURN
373
374 0346 34 02      PST00 PSMS  A
375 0348 0A 00      PST00 LBA  0,1+
376 034B 01 FF      CWP4  DIFF  END OF STRING ?
377 034E 26 02      01E  PST00  NO, PRINT
378 034E 35 02      PULS  A,PC  RETURN IF END OF STRING
379 0350 17 01CE  PST00 L00R  PUTCH2
380 0353 20 F3      00A  PST00  DO NEXT CHAR
381
382      I CLAND00 - CLEAN MESSAGE AREA ON SCREEN
383
384 0355 34 12      CLAND00 PSMS  A,1
385 0357 30 00 0544  LEA1  MODR0S,PCR
386 035B 00 0F      DE0  PST00
387 035D 33 92      PULS  A,1,PC
388
389      ISET - SET CURSOR TO POSITIONS POINTED TO BY I
390
391 035F 34 02      SET  PSMS  A  SAVE INCIPIENT CHARACTER
392 0361 0A 00      LBA  0SETC  SET CURSOR
393 0363 17 0100  L00R  PUTCH2
394 0366 0A 0A      LBA  0,1  GET I POS
395 0368 17 0106  L00R  PUTCH2
396 036A 0A 01      LBA  1,1  GET Y POS
397 036D 17 0101  L00R  PUTCH2
398 0370 33 02      PULS  A,PC  RESTORE CHAR
399
400      IPRINT0 - PRINT ACCUM. "0" IN ME1
401
402 0372 34 06      PRINT0 PSMS  A,0  SAVE CHARACTER
403 0374 0A 10      LBA  0000  LEADIN
404 0376 17 01A0  L00R  PUTCH2
405 0379 0A 10      LBA  0010E1  DISPLAY BYTE IN ME1
406 037B 17 01A3  L00R  PUTCH2
407 037E 0A 01      LBA  1,5  FETCH CHAR
408 0380 17 019E  L00R  PUTCH2
409 0383 33 0A      PULS  A,0,PC
410
411 0385 0A 0F      00YTE LBA  BYTEND,U
412 0387 34 02      PSMS  A  SAVE EXTRA COPY OF BYTE POS
413 0389 0C 03      L00  03
414 038B 0A 0F      000A  0F  GET COL POS (LOWER 1600E1)
415 038D 30 00      00L  0,0
416 038E 0C 02      0000  02  OFFSET FROM LEFT OF SCREEN
417 0390 07 00 10  ST0  COL,U  SAVE FOR CURSOR POSITIONING
418 0393 0A 04      LBA  0,5
419 0395 44 00      L00R  00  GET ROW POS
420 0396 44 00      L00R  00  FROM UPPER
421 0397 44 00      L00R  00  NUMBER OF
422 0398 44 00      L00R  00  BYTE POS
423 0399 00 03      000A  03  OFFSET FROM TOP OF SCREEN
424 039B 07 00 11  ST0  ROW,U  SAVE FOR CURSOR POSITIONING
425 039E 0A 04      L00  0,0
426 03A0 0E 0000  L01  0SECTOR  START OF SECTOR IN BUFFER
427 03A3 3A 00      001  00  ADD IN BYTE 0
428 03A4 06 04      L00  0,1  AND GET THE VALUE
429 03A6 30 00 10  LEA2  COL,U  POSITION THE CURSOR
430 03A9 00 0A      000  00  SET
431 03AB 00 0C      DE0  PRINT0  AND PRINT BYTE IN ME1
432 03AD 1F 90      1FR  0,1
433 03AF 33 04      PULS  0,PC  GET BYTE POS AND RETURN
434
435      000PRINT - DISPLAY BYTE IN ME1 AND ASCII
436
437 03B1 00 02      00PRINT DE0  00YTE
438 03B3 0A 0F      0000  0F  MASK OFF COL NUMBER
439 03B5 0C 30      0000  0A1  ADD IN OFFSET FROM LEFT OF SCREEN
440 03B7 07 00 10  ST0  COL,U  AND SAVE FOR CURSOR POSITIONING
441 03BA 30 00 10  LEA1  COL,U  POSITION CURSOR FOR ASCII
442 03BD 00 0A      DE0  SET
443
444      0PRINT0 - PRINT ASCII IF PRINTABLE, '.' OTHERWISE
445
446 03BF 01 20      PRINT0 CWP4  0020  IS IT PRINTABLE ?
447 03C1 24 02      00S  PRINT0  YES
448 03C3 0A 2E      LBA  0',  NO, SUBSTITUTE '.'
449 03C5 01 7F      PRINT0 CWP4  007F
450 03C7 23 02      00S  001A52
451 03C9 0A 2E      LBA  0',  SAME AS BEFORE
452 03CB 16 0153  PRINT0 L00A  PUTCH2
453
454      0E111 DISKED11, RETURN TO DOS
455
456 03CE 00 03      E111  DE0  KLEUP
457 03D0 7E 00A3  J0P  0000S
458
459 03D3 0A 40      KLEUP LBA  LST0V,U  RESTORE THE LAST TERMINATOR
460 03D5 07 0011  01A  LST0N
461 03D8 30 00 0500  KLE1  LEA1  ER0000,PCR
462 03DB 16 FF47  L00A  PST00
463
464      0OUT00 - OUTPUT DISK HEADER INFO
465
466 03DF 0E 00A0  OUT00 L01  0FC0  OPEN THE
467 03E2 0C 00 1E  L00  50,1  GET CURRENT TRK/SEC
468 03E5 00 40      ST0  1EMP2,U  SAVE CURRENT TR/SEC
469 03E7 0A 10      LBA  016  OPEN SYSTEM INFORMATION RECORD
470 03E9 07 0A      STA  0,1  AND READ IT
471 03EB 00 0A06  J0R  FMS  INTO THE FCB
472 03EE 27 00      DE0  OUT001  NO ERROR - GET STR
473 03F0 00 01      ERROR  DE0  KLEUP
474 03F2 0E 00A0  L01  0FC0  THEN REPORT THE ERROR
475 03F5 00 0033  J0R  00TER0
476 03F8 7E 00A3  J0P  0000S  AND RETURN TO FCB
477 03FB 0E 00A0  OUT001 L01  0FC0  GET THE SYSTEM
478 03FE 0A 07      LBA  07  INFORMATION RECORD
479 0400 07 0A      STA  0,1
480 0402 00 0A06  J0R  FMS
481 0405 26 0F      01E  0000  ERRORS ARE ALL FATAL
482 0407 30 00 0A33  LEA2  S100S,PCR  DISK INFO POSITION
483 0409 17 FF30  L00R  PST00  GET POSITION AND ROW
484 040E 0E 0000  L01  0SECTOR+16  START OF DISKNAME IN SECTOR BUFFER
485 0411 0A 00      OUT001 LBA  0,1+  GET A NAME CHAR
486 0413 27 00      DE0  OUT0E1  IF END OF NAME, DO EXTENSION
487 0415 17 0109  L00R  PUTCH2  OUTPUT IT
488 0418 0C 0000  CP1  0SECTOR+010  END OF NAME FIELD ?
489 041B 26 F4      01E  OUT001  NO, DO NEXT CHAR
490 041D 0A 2E      LBA  0',  SEPARATOR
491 041F 17 00FF  L00R  PUTCH2
492 0422 0E 0000  L01  0SECTOR+010  START OF EXTENSION
493 0425 0A 00      OUT0E1 LBA  0,1+  GET AN EXTENSION CHAR

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491 0427 27 08      BEQ  OUTVOL  END OF EXTENSION, OUTPUT VOLUME 4
495 0429 17 00F5     LBSR  PUTCH2  OUTPUT EXT CHAR
496 042C 0C C870     CPI    0SECTOR+110 END OF EXTENSION FIELD ?
497 042F 26 F4      ONE  OUTE11  NO. DO NEXT CHAR
498 0431 30 00 0417  OUTVOL  LEA1  VOLMSG,PCR VOLUME 4 LOC AND MSG
499 0435 17 FF0E     LBSR  PSTRM  OUTPUT 11
500 0438 0E C870     LDI    0SECTOR+110 VOLUME 4
501 043D 5F         CLRD  SUPPRESS SPACES
502 043C 00 C839     JSR  OUTDEC  OUTPUT IN DECIMAL
503 043F 30 00 0412  LEAR  FREMSG,PCR REMAINING SECTORS MSG AND LOC
504 0443 17 FF0E     LBSR  PSTRM  OUTPUT 11
505 0446 0E C801     LDI    0SECTOR+121 FREE SECTORS
506 0449 5F         CLRD  SUPPRESS SPACES
507 044A 00 C839     JSR  OUTDEC  OUTPUT IN DECIMAL
508 044D 30 00 0416  LEAR  CREMSG,PCR CREATION DATE MSG AND LOC
509 0451 17 FF0E     LBSR  PSTRM
510 0454 4F 49      CLR  TEMP1,U  PLACE 10 PUT DATE VALUES
511 0456 04 C8A3     LDA  0SECTOR+123 MONTH
512 0459 A7 4A      STA  TEMP1+1,U  SAVE FOR OUTPUT
513 045D 5F         CLRD
514 045C 30 49      LEA1  TEMP1,U
515 045E 00 C839     JSR  OUTDEC  OUTPUT MONTH
516 0461 04 2F      LDA  0"/
517 0463 17 0000     LBSR  PUTCH2
518 0466 04 C8A4     LDA  0SECTOR+124 DAY
519 0469 A7 4A      STA  TEMP1+1,U  SAVE FOR OUTPUT
520 046B 5F         CLRD
521 046C 30 49      LEA1  TEMP1,U
522 046E 00 C839     JSR  OUTDEC  OUTPUT DAY
523 0471 04 2F      LDA  0"/
524 0473 17 00A0     LBSR  PUTCH2
525 0476 04 C8A5     LDA  0SECTOR+125 YEAR
526 0479 A7 4A      STA  TEMP1+1,U  SAVE FOR OUTPUT
527 047D 5F         CLRD
528 047C 30 49      LEA1  TEMP1,U
529 047E 00 C839     JSR  OUTDEC  OUTPUT YEAR
530 0481 0C 4B      LDI  0
531 0483 F0 C05E     STI  CTRACK  RESTORE ORIG IN/SEC
532 0486 39         RTS  AND RETURN
533
534
535
536 0487 00 13      INME1  BSR  INME1  GET FIRST HEX DIGIT
537 0489 25 10      BCS  INEAR  NOT A HEX DIGIT
538 048B 40         ABLA
539 048C 40         ABLA  GET TO UPPER NIBBLE
540 048D 40         ABLA  POSITION
541 048E 40         ABLA
542 048F A7 C8 27  STA  HDIG1,U  SAVE TEMPORARILY
543 0492 00 00      BSR  INME1  GET SECOND DIGIT
544 0494 25 05      BCS  INEAR  NOT A HEX DIGIT
545 0496 A8 C8 27  ADBA  HDIG1,U  ADD IN FIRST DIGIT
546 0499 1C FE      ANACK  04FE  SET FOR HEX D.X.
547 049B 39         RTS  AND RETURN
548
549
550
551 049C 00 24      INME1  BSR  INME1
552 049E 31 02      PSNB  A
553 04A0 00 30      SUBA  0930  SAVE IT IN CASE OF ERROR
554 04A2 20 13      WHI  INTRM  CONVERT TO BINARY (MOSTLY)
555 04A4 01 09      CMPA  49  TOO SMALL FOR HEX
556 04A6 2F 0A      BLC  INEHE1  DECIMAL DIGIT ?
557 04A8 01 11      CMPA  0411  YES, D.X. AS IS
558 04AA 20 00      JMI  INTRM  LESS THAN 'A'
559 04AC 01 16      CMPA  0916  GREATER THAN 'F'
560 04AE 2E 07      BGT  INTRM  YES, ILLIGAL
561 04B0 00 07      SUBA  07  CHANGE LETTER TO HEX
562 04B2 32 A1      INZME1  LEAS  6,S  A1J STACK
563 04B4 1C FE      ANBCC  04FE  SET FOR HEX D.X.
564 04B6 39         RTS  AND RETURN
565 04B7 40 C8 28  TRIENR  TST  STORCT,U
566 04B9 27 02      BEB  ENR1
567 04BB 80 76      BSR  STORCT
568 04BD 1A 01      ENR1  ORCC  41  SET HEX INPUT ERROR
569 04BF 35 02      PULB  A,PC
570
571 04C2 4F C8 28  INME1  CLR  NIBCH1,U
572 04C5 00 C815     JSR  GETCH1  GET A CHAR
573 04C8 34 02      PSNB  A
574 04CA 01 20      CMPA  0920  SAVE IT IN CASE OF ERROR
575 04CC 25 03      BLD  03  NO
576 04CE 43 C8 28  BDR  NIBCH1,0
577 04D1 01 09      IN1  CMPA  0909  CURSED RIGHT ?
578 04D3 26 03      BNE  IN2
579 04D5 17 F059     LBSR  BUNPCR  PUMP CURSOR LEFT
580 04D8 01 04      IN2  CMPA  0404  CURSOR LEFT ?
581 04DA 24 04      ONE  IN3
582 04DC 04 09      LDA  0409  BUNPCR
583 04DE 20 0E      BNA  IN3
584 04E0 21 01      IN3  CMPA  01  CURSED UP ?
585 04E2 26 04      ONE  IN4
586 04E4 06 02      LDA  02
587 04E6 20 06      BNA  IN5  PUMP CURSOR DOWN
588 04E8 01 02      IN4  CMPA  02  CURSED DOWN ?
589 04EA 26 05      BNE  IN6
590 04EC 06 01      LDA  01  PUMP CURSOR UP
591 04EE 00 C818     IN5  JSR  PUTCHR
592 04F1 35 02      IN6  PULS  A,PC
593
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595
596 04F3 FC C05E     BAAHND  LDI  CTRACK  CURRENT TRACK & SECTOR
597 04F6 5A         DEED
598 04F7 27 02      BEQ  BACH1  NO SEC ZERO
599 04F9 20 0A      BNA  B1ST5
600 04FB E6 41      BACH1  LDI  N1SEC,U  LOAD LAST SECTOR ON TRACK
601 04FD 40         TSTA  AT 10 ?
602 04FE 26 04      BNE  BACH2  NO
603 0500 A6 C4      LDA  N1TRK,U  YES, GOTO LAST TRACK
604 0502 20 01      BNA  B1ST5  SAVE, GET, AND DISPLAY
605 0504 48         BACH2  DECA  BACKWARDS ONE TRACK
606
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608
609 0505 F0 C05E     DIST5  STI  CTRACK  SAVE NEW TRACK & SECTOR
610 0508 16 FC47     LDA  16  NOW GET AND DISPLAY SECTOR
611
612
613
614 050B FC C05E     FORWARD  LDI  CTRACK  GET CURRENT TRACK & SECTOR
615 050E E1 41      CMPB  N1SEC,U  ARE WE AT HIGHEST SECTOR
616 0510 24 03      BNS  FORM1  YES
617 0512 5C         INCB  NO, RAMP SECTOR
618 0513 20 F0      FORM1  BNA  B1ST5  AND DO IT
619 0515 C6 01      FORM1  LDI  41  SET SECTOR 1
620 0517 A1 C4      CMPA  N1TRK,U  AT THE LAST TRACK ?
621 0519 24 03      BNS  FORM2  YES
622 051B 4C         INCA  NO, RAMP TRACK
623 051C 20 E1      DIST5  BNA  B1ST5  AND DO IT
624 051E 4F         FORM2  CLRA  SET TRACK 0
625 0521 20 E4      BNA  B1ST5  AND DO IT
626
627
628
629 0521 34 02      PUTCH2  PSNB  A
630 0523 00 C818     JSR  PUTCHR
631 0526 35 02      PULS  A,PC
632
633 0528 00 00      OUT15  BSR  OUT15
634 052A 00 00      OUT15  BSR  OUT15
635 052C 34 02      OUT15  PSNB  A
636 052E 06 20      LDA  1920
637 0530 00 EF      BSR  PUTCH2
638 0532 35 02      PULS  A,PC
639
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645 0534 34 10      SCRUBC  PSNB  I
646 0536 30 00 0304  LEA1  0C304,PCR
647 053A 17 FE09     LBSR  PSTRM
648 053D 33 90      SCRC  PULB  I,PC
649
650 053F 34 10      BNSPC  PSNB  I
651 0541 30 00 0304  LEA1  0C304,PCR
652 0545 20 F3      BNA  SCRC
653
654 0547 17 FE0E     FINB  LBSR  KLEN  ERASE SCREEN
655 054A 30 00 0399  LEA1  0399,PCR  POINT TO FIND STRING MSG
656 054E 17 F0F5     LBSR  PSTRM
657 0551 AF C8 12  CLR  NFLAG,0  RESET MATCH FLAG
658 0554 AF 4E      CLR  NDEU,U
659 055A 30 C8 13  LEA1  STRING,U  POINT TO STRING STORAGE AREA
660 055D C6 10      LDI  10  SRCH STRING MAX LENGTH = 16
661 055B 60 4E      GETSTR  TST  NDEU,U
662 055D 26 23      ONE  ASC10  IF FLAG < 0, ENTER AS ASCII
663 055F 17 FF25     LBSR  INME1  ELSE, ENTER AS HEX
664 0562 24 39      BEC  STRSNV
665 0564 01 18      CMPA  0018  DECC
666 0566 27 12      BNE  ASC10B
667 0568 01 01      CMPA  01  CURSED UP ?
668 056A 27 0E      BDR  ASC10B  YES, ASCII MODIFY FROM NON ON
669 056C 01 00      CMPA  00  CARRIAGE RTN ?
670 056E 27 38      BEQ  BUNSTR  IF CR THEN STRING IS COMPLETE
671 0570 01 00      CMPA  00  BACKSPC ?
672 0572 26 E7      BNE  GE1STR  IGNORE CONTROL CHARS
673 0574 06 09      LDA  0609  BUNPCR
674 0576 00 49      BSR  PUTCH2
675 0578 20 E1      BNA  GE1STR
676 057A 34 02      ASC10B  PSNB  A
677 057C 06 FF      LDA  06FF

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670 057E A7 4E STR MORE,U
671 0580 35 92 PULS A
680 0582 17 FF3D ASCI10 LBRN INMD4
681 0585 01 20 CMPA 0120
682 0587 24 14 BMS STOPS4V
683 0589 01 02 CMPA 02 CURSOR DOWN ?
684 0589 21 0A BEQ TONE12 YES, WE1 MODIFY NOW
685 0589 01 00 CMPA 010 CARRIAGE RTN ?
686 0589 27 17 BEQ DUMSTR IF CR THEN STRING IS COMPLETE
687 0591 01 18 CMPA 0ESC
688 0593 26 E0 BME ARCL0
689 0595 00 00 BSR SCRUDC
690 0597 4F 4E TONE12 CLH MORE,U RESET ASCII CHS FLG
691 0599 00 91 BSR OUT15
692 0599 20 0E BSR GETSIR
693 0599 40 00 STASAV ,1* SAVE BYTE
694 0599 60 4E STA MORE,U
695 05A1 26 02 BME STPS
696 05A3 00 07 BSR OUT15
697 05A3 5A STAS DECO
698 05A6 26 03 BME GETSIR
699 05A6 01 10 DUMSTR CMPD B16
700 05A8 1027 F0A4 LBRN REDEEC
701 05AE AF CB 23 STX ENOSTR,U GAVE ADDR+1 OF STRING END
702 05B1 00 C024 JSR PCRLF
703 05B4 30 00 05C6 LEAR WDSOS,PCR START DISK SEARCH ?
704 05B8 17 F0B8 LBRN PSTRN
705 05B8 00 C015 JSR GETCHN CONTINUE ?
706 05B8 01 59 CMPA 0'Y YES
707 05C0 1026 F0AE LBRN REDEEC
708 05C4 30 00 05B6 LEAR WDSOS,PCR
709 05C4 17 F07B LBRN PSTRN
710 05C4 C6 04 LBR 06 LIST MAT 6 ENTRIES PER LINE
711 05C4 E7 CB 20 STD L1ML6,U
712 05D0 4F CLRA
713 05D1 5F CLRD
714 05D2 20 10 BRS BOLDA0
715 05D4 FC CBSE LBR CTRACK
716 05D7 10A3 C4 CMPD M1TR,U SEARCHED ALL TRACKS
717 05DA 1027 00B2 LBRD S1MRU
718 05DE 01 0A CMPD 010
719 05E0 26 02 BME RTN
720 05E2 5F CLRD
721 05E3 4C INCA
722 05E4 3C INCB
723 05E5 10B3 0001 CMPD 01 CHECK FOR TR=0, SEC=1 ILLEGAL
724 05E9 26 01 BME BOLDA0
725 05EB 3C INCB SKIP 10 TR=0, SEC=2
726 05EC F0 CBSE BOLDA0 STD CTRACK
727 05EF 17 F0A4 LBRN BMS GET NEXT SECTOR
728 05F2 10BE C0B0 LBY 0SECTOR
729 05F6 10AF CB 29 STX SECP0,U
730 05FA 30 CB 13 LEAR STR1NG,U POINT AT STRING
731 05FD 04 00 LBR 1*
732 05FF A1 00 SNATCH CMPA ,1*
733 0601 27 00 BEQ MATCH1
734 0603 10BE C0B0 CMPY 0FCB+320
735 0607 24 C0 BRS RELOA0
736 0609 20 F4 BMS SNATCH
737 060B 34 20 MATCH1 PSMS 1 SAVE CURRENT SECH BYTE 0 INDEX + 1
738 060B A6 00 MATCH2 LBR ,1* GET BYTE FROM STRING
739 060F 01 A0 CMPA ,1* COMPARE 10 BYTE IN PCB
740 0611 27 FA BEQ MATCH2
741 0613 30 1F LEAR -1,1 POINT AT END OF STRING
742 0615 39 20 PULS Y GET BYTE 0 INDEX
743 0617 AC CB 23 CMP1 ENOSTR,U REACHED END OF STRING
744 061A 24 0C BMS MATCH2
745 061C 10AE CB 29 LBY SECP0,U
746 0620 31 21 LEAY 1,Y
747 0622 10AF CB 29 STX SECP0,U
748 0626 20 02 BRS UNATCH
749 0628 10AF CB 29 STX SECP0,U
750 062C 34 30 PGSMS LBY CTRACK
751 062E 0E CBSE LBR 1*
752 0631 00 00 JSR OUTHE1 PRINT TRACK 0
753 0634 17 FE75 LBRN OUT15
754 0637 30 01 LEAR 1,1 POINT AT CURRENT SECTOR
755 0639 00 C03C JSR OUTHE1 PRINT SECTOR 0
756 063C 06 FF LBR 00FF
757 063E A7 CB 12 STA MFLAG,U GET MATCH FLAG
758 0641 17 FE66 LBRN OUT20
759 0644 35 30 PULS 1,Y
760 0646 1F 20 TBR Y,0
761 0648 03 C0B1 SUB0 0SECTOR+1 GET BYTE NUMBER
762 064B 17 F074 LBRN PR1NE1 POINT BYTE 0
763 064E 17 FE70 LBRN OUT15
764 0651 6A CB 20 DEC L1ML6,U SUB 1 FROM ENTRIES THIS LINE
765 0654 26 A4 BME UNATCH
766 0656 00 C024 JSR PCRLF
767 0659 C6 04 LBR 06 LIST MAT 6 ENTRIES PER LINE
768 065B E7 CB 20 STD L1ML6,U
769 065E 20 F4 BRS UNATCH

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770 0660 00 C024 STNRU JSR PCRLF
771 0663 30 00 0209 LEAR WDSOS,PCR POINT TO MSG SEARCH COMPLETE
772 0667 60 CB 12 TST MFLAG,U WAS STRING LOCATED ?
773 0668 26 04 BME 07ND IF SO REPORT SEARCH COMPLETE
774 066C 30 00 02E0 LEAR WDSOS,PCR ELSE REPORT NOT FOUND
775 0670 17 FC03 07ND LBRN PSTRN
776 0673 00 C024 JSR PCRLF
777 0676 30 00 02E8 LEAR WDSOS,PCR
778 067A 17 FC09 LBRN PSTRN
779 067D 00 C015 JSR GETCHN CONTINUE ?
780 0680 01 59 CMPA 0'Y YES
781 0682 1027 FE01 LBRD FIND
782 0686 16 FA09 LBRN REDEEC
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039 076E 00 00 DC 39      FC0  SETC,0,12,'9,SETC,0,13,'A,SETC,0,14,'B
0772 00 00 00 41
0776 00 00 0E 42
040 0778 00 00 0F 43      FC0  SETC,0,15,'C,SETC,0,16,'D,SETC,0,17,'E
077E 00 00 10 44
0782 00 00 11 45
041 0786 00 00 12 46      FC0  SETC,0,18,'F
042 0788 00 35 05      RINGR0 FC0  SETC,53,5
043 0780 44 57 49 56      FCC  'DRIVE'
0791 45
044 0792 00 36 06 50      FC0  SETC,54,6,'I,SETC,57,6,'J
0796 00 39 06 50
045 079A 00 35 0A      FC0  SETC,53,10
046 0790 54 52 41 43      FCC  'TRACK'
07A1 48
047 07A2 00 36 00 50      FC0  SETC,54,11,'I,SETC,57,11,'J
07A6 00 39 00 50
048 07AA 00 35 0F      FC0  SETC,53,15
049 07A0 53 45 43 54      FCC  'SECTOR'
07B1 4F 52
050 07B3 00 36 10 50      FC0  SETC,54,16,'I,SETC,57,16,'J
07B7 00 39 10 50
051 07B0 10 1E 06 1E      FC0  NONE,0RE,0RPMC,0RE,0MEMOR,0FF
07BF 17 FF
052 07C1 10 06      TRACK0 FC0  NONE,EEDL
053 07C3 54 52 41 43      FCC  'TRACK / SECTOR 4 1 1188 ) ',OFF
07C7 40 20 2F 20
07C8 53 45 43 54
07CF 4F 3E 20 23
07D3 20 20 20 54
07D7 54 53 53 20
07D0 29 20 20 20
07DE FF
054 07E0 37 00      SPDS FC0  53,11
055 07E2 37 10      SPDS FC0  55,16
056 07E4 37 06      RPPDS FC0  50,6
057 07E6 10 06      RREAR FC0  NONE,EEDL
058 07E8 40 41 30 44      FCC  'HARDWARE ERROR - STATUS: ',OFF
07EC 57 41 52 45
07F0 20 45 52 52
07F4 4F 52 20 20
07F8 20 53 54 41
07FC 54 55 53 5A
0800 20 20 FF
059 0803 20 20 44 55      RREAR2 FCC  * DURING DISK READ, CONTINUE (Y/N)? ',OFF
0807 52 49 4E 47
0808 20 44 49 53
080F 40 20 52 45
0813 41 44 2C 20
0817 43 4F 4E 54
0819 49 4E 55 45
081F 20 20 54 2F
0823 4E 29 3F 20
0827 FF
060 0828 10 06      RONGR0 FC0  NONE,EEDL
061 0828 43 4F 40 40      FCC  'CRASHED', ',OFF
082E 41 4E 44 3A
0832 20 20 FF
062 0835 10 06      RRMGS FC0  NONE,EEDL
063 0837 44 52 49 54      FCC  'DRIVE 0 ',OFF
0838 45 20 23 20
083F FF
064 0840 00 00 13 06      D1POS FC0  SETC,0,19,EEDL
065 0844 44 49 53 48      FCC  'DISK: ',OFF
0848 5A 20 20 FF
066 084C 20 20 56 4F      VOLRGS FCC  * VOL. 0 ',OFF
0850 4C 2E 20 23
0854 FF
067 0855 20 20 66 52      FIRENG FCC  * FREE SECTORS: ',OFF
0859 43 45 20 53
085B 45 43 54 4F
0861 52 53 5A 20
0863 20 FF
068 0867 20 20 43 52      CRENGS FCC  * CREATION DATE: ',OFF
0868 45 41 54 49
086F 4F 4E 20 44
0873 41 54 45 5A
0877 20 20 FF
069 087A 00 1F 00      RRMGS FC0  SETC,31,0
070 0878 20 42 39 54      FCC  ' BYTE 0  MEK v  ABCDE ',OFF
0881 45 20 23 20
0885 20 20 20 20
0889 40 45 50 20
088B 76 20 20 20
0891 01 53 43 49
0895 49 20 3E FF
071 0899 22 01      RPPDS FC0  34,1
072 0899 20 01      ME1POS FC0  45,1
073 0899 36 01      RSCPOS FC0  54,1
074 089F 00 00 01 06      RRMGS FC0  SETC,0,1,SEDL,NONE,EEDL,OFF
08A3 10 06 FF
075 08A6 10 06      RRMGS FC0  NONE,EEDL

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076 08B0 57 52 49 54      FCC  'WRITE ALTERED SECTOR TO DISK (Y/N)? ',OFF
08B6 45 20 41 4E
08B8 54 43 52 45
08B4 44 20 53 45
08B8 43 54 4F 52
08B8 20 54 4F 20
08C0 44 49 53 48
08CA 20 20 54 2F
08CB 4E 29 20 3F
08CC 20 FF
077 08CE 10 06      LINKS FC0  NONE,EEDL
078 08D0 0E 4F 20 53      FCC  'NO SECTOR LINK ADDRESS',OFF
08D4 45 43 54 4F
08D8 52 20 4C 49
08DC 4E 40 20 41
08DE 44 44 52 45
08E4 53 53 3F
079 08E7 45 4E 54 45      RRMGS FCC  'ENTER SEARCH STRING  MEK v  ABCDE ',OFF
08ED 52 20 53 45
08EF 41 52 43 40
08F3 20 53 54 52
08F7 49 4E 47 20
08F8 20 20 20 20
08FF 20 20 40 45
0903 50 20 76 20
0907 20 20 41 53
090B 43 49 49 20
090E SE
080 0910 00 00 00 FF      FC0  00,0A,0A,0FF
081 0914 00 20 00 FF      RONGR0 FC0  0,020,0,0FF
082 0918 45 44 49 54      RRMGS FCC  'EDIT DISK IN DRIVE NUMBER (0-3) ? ',OFF
091C 20 44 49 53
0920 40 20 49 4E
0924 20 44 52 49
0928 54 45 20 4E
092C 53 40 42 45
0930 52 20 20 20
0934 50 20 20 20
0938 33 20 29 20
093C 3F 20 20 FF
083 0940 53 45 41 52      RRMGS FCC  'SEARCH COMPLETE',OFF
0944 43 40 20 43
0948 4F 40 50 4E
094C 45 54 45 FF
084 0950 53 54 52 49      RRMGS FCC  'STRING NOT FOUND ',OFF
0954 4E 47 20 4E
0958 4F 54 20 46
095C 4F 55 4E 44
0960 20 FF
085 0962 43 4F 4E 44      RRMGS FCC  'COMPLET NEW SEARCH ? (Y/N) ',OFF
0966 53 45 54 20
096A 4E 45 57 20
096E 53 45 41 52
0972 43 40 20 3F
0976 20 20 59 2F
097A 4E 29 20 FF
086 097E 53 54 41 52      RRMGS FCC  'START DISK SEARCH ? (Y/N) ',OFF
0982 54 20 44 49
098A 53 40 20 53
098E 43 41 52 43
0990 40 20 3F 20
0992 20 59 2F 4E
0996 29 20 FF
087 0999 1E 07 10 16      RRMGS FC0  0RE,10RME,NONE,0RPMON,OFF
099B FF
088 099E 00 06      RRMGS FC0  00,EEDL
089 09A0 20 34 18 20      FCC  '(CLK 4) 1SEC 01 1BYTE 01,00,0A,0FF
09A4 23 29 20 20
09A8 20 53 45 43
09AC 20 23 29 20
09B0 20 20 20 42
09B4 59 54 45 20
09B8 23 29 00 00
09BC FF
090 09B9 00 00 03      RRMGS FC0  SETC,0,3
091 09C0 20 20 42 2E      FCC  * 0. AUTO-LINE BACK TO PREVIOUS (TRACK/SECTOR),00,0A
09C4 20 41 55 54
09C8 4F 20 4C 49
09CC 4E 48 20 42
09D0 41 43 48 20
09D4 54 4F 20 50
09D8 52 45 56 49
09DC 4F 55 55 20
09E0 54 52 41 43
09E4 48 2F 53 45
09E8 43 54 4F 52
09EC 00 0A
092 09EE 20 20 44 2E      FCC  * 0. SET NEW DRIVE 0',00,0A
09F2 20 47 45 54
09F6 20 4E 45 57
09FA 20 44 52 49
09FE 56 45 20 23

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0002 00 00
093 0004 20 20 45 7E
0008 20 45 50 4F
000C 54 20 54 4F
0010 20 46 0E 45
0014 50 00 00
094 0017 20 20 44 7E
001B 20 41 55 54
001F 4F 70 4E 49
0025 4E 48 20 46
002B 4F 52 57 41
002F 52 44 20 54
0033 4F 20 4E 45
0037 58 54 20 54
003B 52 41 43 48
003F 2F 53 45 43
0043 54 4F 52 00
0047 00
095 0044 20 20 40 7E
0048 20 40 4F 44
004C 49 46 59 20
0050 43 55 52 52
0054 45 4E 54 20
0058 53 43 43 54
005C 4F 52 00 00
096 0060 20 20 20 20
0064 20 20 3C 7E
0068 20 20 20 20
006C 20 53 54 45
0070 50 20 42 91
0074 43 48 20 54
0078 46 52 53 20
007C 53 45 43 54
0080 4F 52 00 00
097 0084 20 20 20 20
0088 20 20 3E 7E
008C 20 20 20 20
0090 20 53 54 45
0094 50 20 41 48
0098 45 41 44 20
009C 54 48 52 55
00A0 20 53 45 43
00A4 54 4F 52 00
00A8 00
098 00A9 20 20 20 7B
00AD 48 4F 4D 45
00B1 29 7E 20 20
00B5 20 53 45 54
00B9 20 42 59 54
00BD 45 20 50 4F
00C1 53 49 54 49
00C5 4F 4E 00 00
099 00C9 20 20 20 20
00CD 20 20 76 7E
00D1 20 20 20 20
00D5 20 53 45 4C
00D9 45 43 54 20
00DD 48 45 50 20
00E1 44 41 54 41
00E5 20 45 4E 54
00E9 52 59 20 4D
00ED 4F 44 45 00
00F1 00
100 00F2 20 20 20 20
00F6 20 20 5E 7E
00FA 20 20 20 20
00FE 20 53 45 4C
0007 45 43 54 20
000A 41 53 43 49
000D 49 20 44 41
000E 54 41 20 45
0012 4E 54 52 59
0016 20 48 4F 44
001A 45 00 00
101 001B 20 20 20 20
0021 20 45 53 43
0025 29 7E 20 20
0029 20 54 4F 47
002B 47 4C 45 20
0031 40 45 50 2F
0035 41 53 43 49
0039 49 20 40 4F
003D 44 45 00 00
102 0041 20 20 52 7E
0045 20 53 45 43
0049 52 43 48 20
004B 46 4F 52 20
0051 48 45 50 2F
0055 41 53 43 49
0059 49 20 53 54
005D 52 49 4E 47

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FCC 'E. EXIT TO PLEZ',00,00

FCC 'F. AUTO-LINK FORWARD TO NEXT TRACK/SECTOR',00,00

FCC 'H. MODIFY CURRENT SECTOR',00,00

FCC 'I. STEP BACK THRU SECTOR',00,00

FCC 'J. STEP AHEAD THRU SECTOR',00,00

FCC 'K. (HOME), SET BYTE POSITION',00,00

FCC 'L. SELECT HEX DATA ENTRY MODE',00,00

FCC 'M. SELECT ASCII DATA ENTRY MODE',00,00

FCC 'N. (ESC), TOGGLE HEX/ASCII MODE',00,00

FCC 'O. SEARCH FOR HEX/ASCII STRING ON DISK',00,00

```

0061 20 4F 4E 20
0065 44 49 53 40
0069 00 00
103 006B 20 20 54 7E
006F 20 53 50 45
0073 43 49 46 59
0077 20 4E 45 57
007B 20 54 52 41
007F 43 4B 2F 53
0083 45 43 54 4F
0087 52 00 00
104 008A 20 20 54 7E
008E 20 54 45 52
0092 4F 20 43 55
0096 30 52 45 4E
009A 54 20 54 52
009E 41 43 4B 2F
00A2 53 45 43 54
00A6 4F 52 00 00
105 00AA 20 20 3E 7E
00AE 20 46 4F 52
00B2 57 41 52 44
00B6 20 54 4F 20
00BA 4E 45 50 54
00BE 20 53 45 51
00C2 7E 20 54 52
00C6 41 43 4B 2F
00CA 53 45 43 54
00CE 4F 52 00 00
106 00D2 20 20 3E 7E
00D6 20 47 41 43
00DA 48 57 41 52
00DE 44 20 54 4F
00E2 20 4C 41 53
00E6 54 20 53 45
00EA 51 2E 20 54
00EE 52 41 43 4B
00F2 2F 53 45 43
00F6 54 4F 52 00
00FA 00 FF
107 00FC 49 4C 4C 45
0000 47 41 4C 20
0004 54 52 41 43
0008 40 2F 53 45
000C 43 54 4F 52
0010 20 53 50 45
0014 43 49 46 49
0018 45 44 FF
108 001B 4E 4F 20 53
001F 45 43 54 4F
0023 52 20 4C 49
0027 4E 48 20 44
002B 41 54 41 20
002F 4F 4E 20 53
0033 54 41 43 4B
0037 FF

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FCC 'T. SPECIFY NEW TRACK/SECTOR',00,00

FCC 'I. ZERO CURRENT TRACK/SECTOR',00,00

FCC 'J. FORWARD TO NEXT SEQ. TRACK/SECTOR',00,00

FCC 'K. BACKWARD TO LAST SEQ. TRACK/SECTOR',00,00,OFF

ILLEGAL FCC 'ILLEGAL TRACK/SECTOR SPECIFIED',OFF

STRO FCC 'NO SECTOR LINE DATA ON STACK',OFF

DISKETT COMMAND TABLE

CONTROL	FCC	'B'	PREVIOUS LINKED TRACK/SECTOR
LORA	PREV	'B'	PREVIOUS LINKED TRACK/SECTOR
FCC	NEW DRIVE 4	'B'	NEW DRIVE 4
LORA	NEW DRV	'B'	NEW DRIVE 4
FCC	EXIT DISKEDIT	'E'	EXIT DISKEDIT
LORA	EXIT	'E'	EXIT DISKEDIT
FCC	'F'	'F'	AUTO-LINK TO NEXT SECTOR
LORA	LINK	'F'	AUTO-LINK TO NEXT SECTOR
FCC	'H'	'H'	MODIFY CURRENT SECTOR
LORA	MODIFY	'H'	MODIFY CURRENT SECTOR
FCC	'S'	'S'	SEARCH FOR HEX/ASCII STRING ON DISK
LORA	FIND	'S'	SEARCH FOR HEX/ASCII STRING ON DISK
FCC	'I'	'I'	NEW TRACK-SECTOR
LORA	TRKSEC	'I'	NEW TRACK-SECTOR
FCC	'Z'	'Z'	ZERO SECTOR
LORA	ZEROSC	'Z'	ZERO SECTOR
FCC	'J'	'J'	J FORWARD TO NEXT SECTOR
LORA	FORWARD	'J'	J FORWARD TO NEXT SECTOR
FCC	'K'	'K'	K BACKWARD TO LAST SECTOR
LORA	BACKWARD	'K'	K BACKWARD TO LAST SECTOR
FCC	'?'	'?'	HELP
LORA	HELP	'?'	HELP
FCC	'0'	'0'	END OF COMMAND TABLE

STACK RMB 61000
TOPSTK RMB 1
VARIABLES RMB 1000
END

0 ERROR(S) DETECTED

TRS80C

Ralph Tenny, P O Box 545, Richardson TX 75080

NOTES ON THE TRS-80C COLOR COMPUTER

Those who try to interface any printer except the particular Radio Shack model intended for use with the TRS-80C may find some reluctance on the part of the computer to part with its data until you discover that the line designated "data in" (pin 2 of the printer port) must be pulled high. It seems that this line is used by the software as a busy line. If there is no corresponding return line from your printer, nothing happens. The serial port on my KIM-1 meets this requirement, but when I tried to dump to the word processor used to print these comments, I had to furnish a separate bias source. My solution was to put the data line in question through a closed-circuit phone jack, and tie in a 9 volt radio battery via the phone plug.

Once this "printer busy" problem was solved, two more popped up. I had no printer with 600 baud input (except the word processor) and the computer sends only a carriage return instead of CRLF. I could borrow a small printer, but I have to tote the computer to work in order to use the word processor as a printer. The printer needs a line feed with carriage return, but the word processor (NBI Model 3000) is a document oriented machine, so it accepts a string of text up to 100 pages long before it runs into trouble. In this case, the solution was to dump a buffer full to the KIM-1 at 600 baud and print the resulting string on the printer at 300 baud, inserting line feeds as needed.

Hopefully, the comments above will save someone else time if they begin to probe into their TRS-80C. If anyone is serious about doing a lot of machine language work on their Color Computer, I can recommend the machine language monitor tape by Micro Works. It does all it is advertised to do, and works very well. For a small bit of fooling around, the program listed below allows one to examine memory one location at a time, clear a block of memory, and to enter machine language in a continuous string, beginning at a particular address.

To use the program, RUN it and it asks for entry mode or verify mode. Besides "E" or "V", you can enter up arrow, left arrow or clear keys. Clear is an exit, up arrow causes the current value of the entry pointer to be printed, and left arrow is command mode. In the version shown, only command "C" is implemented: this asks for a start address and how

many bytes to clear (write 00) into. Other functions can easily be implemented by allowing the command to accept other than "C" from the keyboard. If you enter "E", the program asks for a starting address and accepts hex address data, followed by successive bytes of machine code. You must enter leading zeros, and it processed the first four received, as is common with some 6809 systems. Similarly, it accepts the first two hex digits of machine code and enters them. As each hex value is entered, the equivalent decimal value is echoed to the screen. If you lose track of where you are, enter the up arrow. This prints the address of the next location to be loaded. After a delay, control returns to the start and you can either verify or enter more code, beginning with the pointer value called up by the up arrow. If you choose verify, it asks for the start address and then reports the contents of that address. Press any key to step to successive addresses, one at a time.

Ralph Tenny, P O Box 545, Richardson Tx 75080

THIS PROGRAM ALLOWS THE USER TO EXAMINE MEMORY, ENTER MACHINE CODE DIRECTLY IN HEX, AND VERIFY THE ENTRY.

```

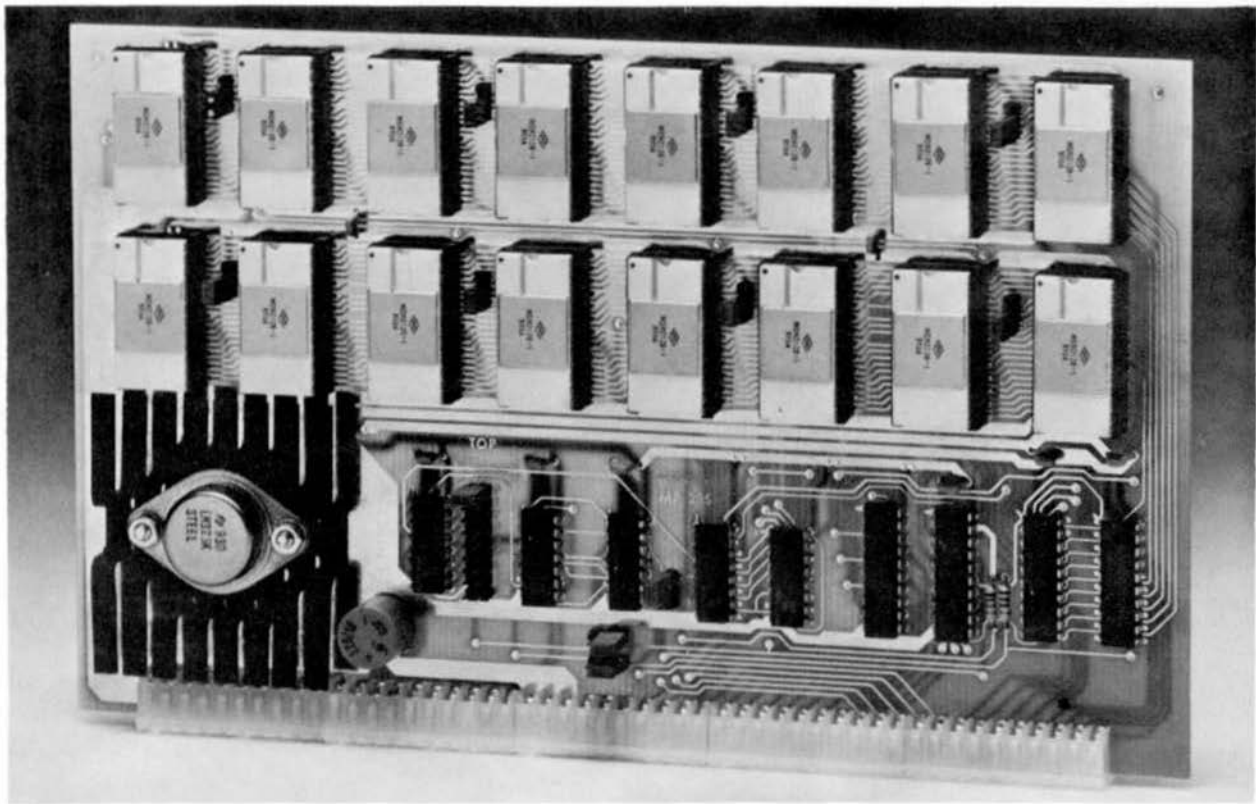
5 GOTO 1000
7 REM THIS ROUTINE REPEATEDLY SCANS FOR ANY KEY
10 AS=INKEY$
20 IF AS= "" THEN 10
30 IF ASC(AS)=12 THEN 300
31 IF ASC(AS)=94 THEN 42
33 IF ASC(AS)=8 THEN 60
35 RETURN
40 REM PRINT CURRENT ADDRESS
42 PRINT I
44 GOTO 1045
50 REM PRINT FLAG FOR COMMAND MODE
60 PRINT "":GOTO 2000
100 REM THIS ROUTINE GETS A DECIMAL VALUE OF A HEX BYTE
110 GOSUB 10
120 IF ASC(AS)>57 THEN 140
130 H=(ASC(AS)-48)*16
135 GOTO 145
140 H=(ASC(AS)-55)*16
142 IF H>240 THEN 1037
145 GOSUB 10
150 IF ASC(AS)>57 THEN 165
155 L=ASC(AS)-48
160 GOTO 170
165 L=ASC(AS)-55
170 D=H+L
172 IF L>15 THEN 1037
180 RETURN
290 REM EXIT WITH "CLEAR" KEY
300 STOP
305 REM THIS ROUTINE ACCEPTS ANY KEY AS A SIGNAL TO
307 REM PRINT THE CONTENTS OF THE NEXT LOCATION
310 DC=PEEK(C)
320 FOR T=1 TO 20
330 NEXT T
340 PRINT C;DC
345 GOSUB 10
350 C=C+1:GOTO 310
399 REM THIS ROUTINE CONCATENATES TWO HEX BYTES
400 GOSUB 110
410 K=D*256
420 GOSUB 110
430 I=K+D
440 RETURN

```

```

999 REM MAIN PROGRAM
1000 CLS
1002 PRINT " MACHINE CODE ENTRY"
1005 PRINT "-----"
1010 PRINT " SELECT FIRST LETTER OF MODE"
1011 PRINT " ENTRY"
1012 PRINT " VERIFY"
1020 GOSUB 10
1030 IF AS = "E" THEN 1060 ELSE 1035
1035 IF AS = "V" THEN 1080 ELSE 1040
1037 PRINT " INVALID NUMBER"
1038 GOTO 1045
1040 PRINT " INVALID SELECTION"
1045 FOR T=1 TO 500
1050 NEXT T
1055 GOTO 1000
1060 PRINT " ENTER STARTING ADDRESS"
1062 GOSUB 400
1064 PRINT I
1066 PRINT " ENTER DATA"
1068 GOSUB 110
1070 PRINT D
1072 POKE I,D
1075 I=I+1:GOTO 1068
1080 PRINT " ENTER FIRST ADDRESS"
1085 GOSUB 400
1090 C=I:GOTO 310
1999 REM BEGIN COMMAND MODE SECTION
2000 PRINT "COMMAND?"
2001 GOSUB 10
2002 IF AS="" THEN 2001
2004 IF AS<>"C" THEN 2060
2005 REM MEMORY CLEAR COMMAND
2006 PRINT " MEMORY CLEAR"
2007 PRINT " ENTER FIRST ADDRESS"
2010 GOSUB 400
2015 PRINT I
2020 PRINT " ENTER NUMBER OF LOCATIONS"
2021 PRINT " TO CLEAR (255 MAX)"
2025 GOSUB 110
2030 N=D
2035 POKE I,0

```

UNIVERSAL STATIC MEMORY

- ★ 32K bytes - ROM, RAM, EPROM or a combination
- ★ SS-50 A&C compatible with 16 and 20 bit address decoding
- ★ Compatible with all SWTPC 6800 and 6809 computers
- ★ 2.0 MHz - 5.0 Volts only

This is the most versatile memory card you can buy. Our S-32 may be populated with up to 32K of static RAM, EPROM, or ROM, or any 4K block combination of these that you may desire. Any 5-volt 2716 pinout compatible memory may be used in this card. Any 4K block of memory may be jumper block programmed for RAM or ROM use. This feature makes this the ideal memory for those process control applications that require a mixture of ROM and RAM

memory. The board is fully compatible with all SWTPC 6800 and 6809 computers.

The power requirement for the board is only 1.75 amps at 5.0 volts with a full 32K of RAM installed.

S-32 Circuit card only \$ 99.50
 S3216 with 16K of RAM \$295.00 ea.
 S3232 with 32K of RAM \$495.00 ea.



SOUTHWEST TECHNICAL PRODUCTS CORPORATION
 219 W. RHAPSODY
 SAN ANTONIO, TEXAS 78216 (512) 344-0241

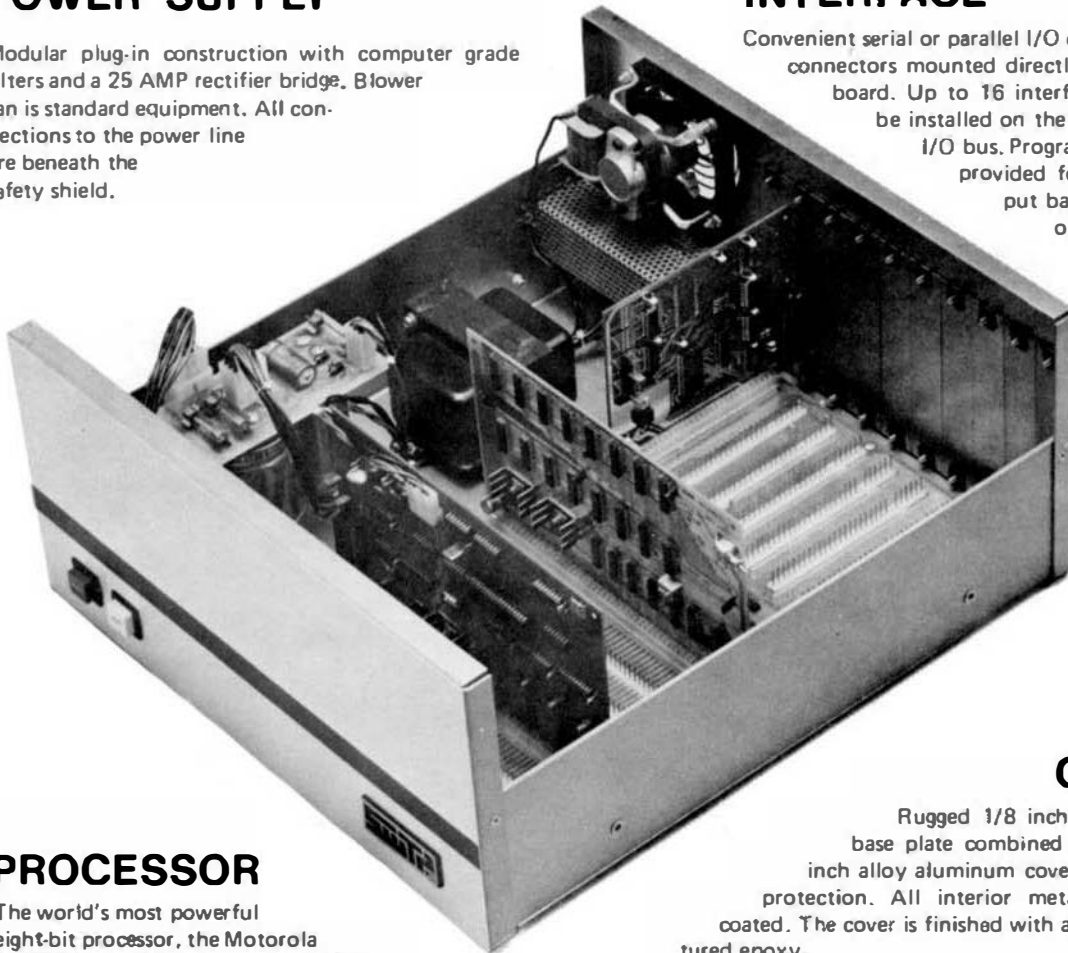
WE HAVE A 6809 FOR YOU

POWER SUPPLY

Modular plug-in construction with computer grade filters and a 25 AMP rectifier bridge. Blower fan is standard equipment. All connections to the power line are beneath the safety shield.

INTERFACE

Convenient serial or parallel I/O cards have DB-25 connectors mounted directly on the circuit board. Up to 16 interface devices may be installed on the address decoded I/O bus. Programming strips are provided for input and output baud rate selection on each port. All outputs are fully buffered.



PROCESSOR

The world's most powerful eight-bit processor, the Motorola MC6809, plus 2K byte monitor ROM that is 2716 EPROM compatible and full buffering on all output lines. Built-in multiuser capability, just add I/O cards to operate a multi-terminal system.

CABINET

Rugged 1/8 inch alloy aluminum base plate combined with a solid 1/8 inch alloy aluminum cover for unsurpassed protection. All interior metal is conversion coated. The cover is finished with a super tough textured epoxy.

MEMORY— You can purchase the computer with either 8K bytes of RAM memory (expandable to 56K), or with the "S" series 64K bytes of RAM memory expandable to 768 K.

PERIPHERALS— The wide range of peripheral hardware that is supported by the 6809 includes: dot matrix printers (both 80 and 132 column), IBM Electronic 50 typewriter, daisy wheel printers, 5-inch floppy disk system, 8-inch floppy disk systems and a 16 megabyte hard disk.

SOFTWARE— The amount of software support available for the 6809 is incredible when you consider that it was first introduced in June, 1979. In addition to the FLEX9 operating system, we have a Text Editor, Mnemonic Assembler, Debug, Sort-Merge, BASIC, Extended BASIC, MultiUser BASIC, FORTRAN, PASCAL and PILOT.

69/K Computer Kit with 8K bytes of memory	\$ 575.00
69/A Assembled Computer with 8K bytes of memory	\$ 695.00
09/ Assembled Computer "S" series with 64K bytes of memory	\$1,595.00



SOUTHWEST TECHNICAL PRODUCTS CORPORATION
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```

102 A1C6 B1 A1 07 L18152 OP A FIRST AT FIRST LINE?
103 A1C7 22 07 BHI L18153
104 A1C8 25 0A BFC L18154
105 A1C9 F1 A1 08 BFP B FIRST+1
106 A1D0 25 05 BCB L18154
107 A1D2 B6 01 L18155 LDA A SET OUTPUT FLAG
108 A1D4 B7 A1 05 BTA A OUTPUT
109 A1D7 F6 A1 15 L18154 LDA A BPOINT
110 A1D8 B6 A1 17 BFC BEND END OF BUFFER?
111 A1D9 27 08 BEO L18157
112 A1DF A6 00 LDA A O,X
113 A1E1 08 INZ INZ
114 A1E2 FF A1 13 STX BPOINT
115 A1E3 20 10 BPA L1816
116 A1E7 B6 A1 14 L18157 LDA A MORE
117 A1E8 27 09 BEO L18156
118 A1E9 B0 A2 27 BPA READ
119 A1EF 20 06 BPA L1816
200
201 A1F1 B0 B4 03 L18156 JBR FMSCLB
202 A1F4 7E AD 03 JBR WARRMS
203
204 A1F7 7D A1 05 L1816 B1 OUTF
205 A1FA 27 39 BMO L18165
206 A1FC 36 BPA A
207 A1FD 7D A1 0F B1 PAGE
208 A200 27 13 BEO L18163
209 A202 B6 A1 10 LDA A LINE
210 A205 B1 36 CWP A #54
211 A207 26 0C BME L18163
212 A209 7C A1 13 INC PAGE+N
213 A20C B6 A1 0E LDA A FF
214 A20F B0 AD 18 JBR PUTCHR
215 A212 B0 A3 09 JBR DOWDA
216 A215 32 L18163 MUL A
217 A216 7D A1 06 TBI NUMB
218 A219 27 1A BEO L18165
219 A21B 2A BPA A
220 A21C CE A1 09 LDA B
221 A21F C6 01 LDA B #01
222 A221 B0 AD 39 JBR OUTDEC
223 A224 B6 2E LDA A #1
224 A226 B0 AD 3B JBR PUTCHR
225 A229 CE A1 09 LDA #ZERO
226 A22C B0 AD 3C JBR OUTDEC
227 A22F B0 3D LDA A #1
228 A231 B0 AD 18 JBR PUTCHR
229 A234 32 FUL A
230 A235 B1 0D L18165 CWP A #00
231 A237 26 0E BME L18167
232 A239 7D A1 05 TBI OUTF
233 A23C 27 06 BEO L18166
234 A23E 7C A1 10 INC LINE
235 A241 B0 AD 24 JBR PCRLF
236 A244 7E A1 0B L18166 JBR L18155
237 A247 B1 1F CWP A #01F
238 A249 23 08 BLS L18168
239
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251 A24B 7D A1 05 B1 OUTF
252 A24E 27 03 BEO L18168
253 A250 B0 AD 18 JBR PUTCHR
254 A253 FE A1 15 L18168 LDA A BPOINT
255 A256 B6 A1 17 BFC BEND
256 A259 27 08 BEO L18169
257 A25B B6 00 LDA A O,X
258 A25D 08 INZ INZ
259 A25F FF A1 15 B1 BPOINT
260 A261 20 D2 BPA L1816
261 A263 B6 A1 14 L1816 LDA A MORE
262 A266 27 04 BEO L18161
263 A268 B0 0D BPA READ
264 A26A 20 09 BPA L18165
265
266
267
268 A26C B0 B4 03 L18161 JBR FMSCLB
269 A26F 7E AD 03 JBR WARRMS
270
271
272
273 A272 B0 AD 3F L1817 JBR RPTERR
274 A275 26 F3 BPA L18161
275
276
277
278 A277 CE 02 00 READ LDA #BUFFER
279 A27A FF A1 15 B1 BPOINT
280 A27D 7F A1 14 CLK MORE
281 A280 CE A0 90 LDA B #FCB
282 A283 B0 B4 06 BEO FMS
283 A286 27 14 BEO READB
284 A288 B6 01 READ2 LDA A I,X
285 A28A B1 08 CWP A #1
286 A28C 27 03 BEO READ3
287 A28E 7E A2 72 JBR L1817
288
289 A291 FE A1 15 READ3 LDX BPOINT
290 A294 FF A1 17 STX BEND
291 A297 7F A1 14 CLR MORE
292 A29A 20 14 BPA ARTS
293
294 A29C FE A1 15 READ6 LDA BPOINT
295 A29F B7 00 BTA A O,X
296 A2A1 08 INZ INZ
297 A2A3 FF A1 19 B1 BPOINT
298 A2A6 B0 7F FF CWP #BUFFER+1
299 A2A8 26 06 BME READ1
300 A2AA FF A1 17 STX BEND
301 A2AD B6 01 LDA A #1
302 A2AF B7 A1 14 BTA A MORE
303 A2B2 CE 02 00 HRTS LDA BPOINT
304 A2B5 FF A1 15 B1
305 A2B8 39 HRTS
306

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307
308
309 A2B9 B4 AC 11 TB1THM LDA A LBT1THM
310 A2BC B1 00 CWP A #000
311 A2BE 27 03 BEO TB1TR2
312 A2B0 B1 AC 02 TB1TR2 R16
313 A2C3 39
314
315
316
317 A2C4 CE A3 04 UET1L LDP #TTST
318 A2C7 7C AC 22 INC OUTCHN
319 A2CA B0 AD 1E JBR PSTRNG
320 A2CD CE A3 93 LDI #TITLE
321 A2D0 2F BPA B
322 A2D1 B0 AD 15 UET1L2 JBR BOP
323 A2D4 B1 AC 09 CWP A #00
324 A2D7 27 17 BEO UET1L4
325 A2D9 B1 AC 01 CWP A DEL
326 A2DC 27 E6 BEO UET1L
327 A2DE B1 0D CWP A #00D
328 A2E0 27 13 BEO UET1L6
329 A2E2 B1 1F CWP A #01F
330 A2E4 23 E8 BLS UET1L2
331 A2E6 C1 27 CWP B #19
332 A2EB 27 E7 BEO UET1L2
333 A2EA A7 00 BIA A O,X
334 A2EC 08 INZ INZ
335 A2ED 5C INC B
336 A2EE 20 E1 BPA UET1L2
337 A2F0 5D LDI B
338 A2F1 27 D1 BEO DEC B
339 A2F3 5A DEC B
340 A2F4 09 BPA UET1L6
341 A2F5 20 DA BPA UET1L2
342 A2F7 B6 20 LDA A #920
343 A2F9 A7 00 BTA A O,X
344 A2FB 08 INZ INZ
345 A2FC 5C INC B
346 A2FD E1 27 LMP D #00
347 A2FF 26 F6 BME UET1L6
348 A301 B6 04 LDA A #004
349 A303 A7 00 BIA A O,X
350 A305 7F AC 22 CLK OUTCHN
351 A308 39 HRTS
352
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355 A309 B0 AD 24 DOWDA JBR PCRLF
356 A30C B0 AD 24 JBR PCRLF
357 A30F CE A3 93 LDI #TITLE
358 A312 B0 AD 1E JBR PSTRNG
359 A315 B0 35 BPA SPA
360 A317 3F CLK B
361 A319 B6 AC DE LDA A MONTH
362 A31B B1 09 CWP A #009
363 A31D 23 01 BLS DOWDA1
364 A31F 5C INC B
365 A320 B7 A1 12 DOWDA1 LDA A VALUE+1
366 A323 B6 AC 0F LDA A DAY
367 A326 B1 09 LMP A #009
368 A328 23 01 BLS DOWDA2
369 A32A 5C INC B
370 A32B 5D BEO DOWDA4
371 A32E 27 05 BEO DOWDA
372 A32F B0 40 DOWDA3 DEC B
373 A330 5A DEC B
374 A331 26 F8 BME DOWDA3
375 A333 CE A1 11 DOWDA4 LDI #VALUE
376 A336 B0 AD 39 JBR OUTDEC
377 A339 B6 AC 0F LDA A DAY
378 A33C B0 37 BPA PDATE
379 A33E B6 AC 10 LDA A YEAR
380 A341 B0 32 BPA MONTH
381 A343 B0 27 BPA SPA
382 A345 CE A3 MC LDX #PAGE
383 A348 B6 00 LDA A O,X
384 A34A 27 06 BEO DOWDA6
385 A34C B0 AD 18 JBR PUTCHR
386 A34E 41 08 INZ INZ
387 A350 20 F6 BPA DOWDA5
388 A352 3F CLK B
389 A353 B6 A1 13 LDA A PAGE+N
390 A356 B7 A1 12 BTA A VALUE+1
391 A359 CE A1 11 LDI #VALUE
392 A35C B0 AD 39 JBR OUTDEC
393 A35F B0 AD 24 JBR PCRLF
394 A362 B0 AD 24 JBR PCRLF
395 A365 B0 AD 24 JBR PCRLF
396 A368 7F A1 10 CLK LINE
397 A36B 39 HRTS
398
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400
401 A36C B0 00 BPA BOP
402 A36E B0 00 BPA BPA2
403 A370 B6 20 BPA2 LDA A #020
404 A372 7E AD 1B JBR PUTCHR
405
406
407
408 A375 B7 A1 12 PDATE BTA A VALUE+1
409 A378 B6 20 LDA A #020
410 A37A B0 AD 1B JBR PUTCHR
411 A37D 3F CLK B
412 A37E CE A1 11 LDI #VALUE
413 A381 7E AD 39 JBR OUTDEC
414
415
416
417 A384 54 TTST FCC #TITLE?
418 A38B 04 FCB 4
419
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421 A38C 20 NPAGE FCC #PAGE
422 A394 00 FCB 0
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425 A395 TTITLE RMB 41 TITLE BUFFER
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SPLIT.CMD REV1.1 8 FEB 1981
 MODIFIED BY R. J. SHERMAN TO ALLOW THE USE
 OF A RAM BUFFER TO REDUCE THE LARGE NUMBER
 OF DISK ACCESSES NORMALLY ATTRIBUTED TO THE
 ORIGINAL 'SPLIT.CMD'.
 COMMAND SYNTAX IS UNCHANGED:
 SPLIT, (INPUT FILE SPEC), (OUT FILE SPEC),
 (OUT FILE SPEC2), (N)
 THE INPUT FILE IS THE FILE TO BE SPLIT. OUTPUT
 FILE SPEC 1 IS THE NAME TO BE ASSIGNED TO THE
 FIRST SET OF LINES READ FROM THE INPUT FILE.
 OUTPUT FILE SPEC 2 IS THE NAME ASSIGNED TO THE
 REST OF THE FILE BEING SPLIT, AND N IS THE LINE
 NUMBER WHERE THE FILE SHOULD BE SPLIT. THE
 SECOND OUTPUT FILE WILL BEGIN WITH LINE N OF THE
 INPUT FILE. ALL FILES DEFAULT TO .TXT EXTENSIONS
 AND TO THE WORKING DRIVE.
 AN EXAMPLE:
 SPLIT, TEST, TEST1, TEST2, 125
 FILE 'TEST' WILL BE SPLIT INTO TWO FILES.
 'TEST1' WILL CONTAIN THE FIRST 124 LINES WHILE
 'TEST2' WILL CONTAIN THE REMAINDER.
 THE ORIGINAL FILE REMAINS UNCHANGED.

PCBN	EQ	NAME	SOURCE FILE FCB
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

PCBN	EQ	NAME	SOURCE FILE NAME
AD2D	EQ	AD2D	
AD33	EQ	AD33	
B006	EQ	B006	
AD48	EQ	AD48	
AD3F	EQ	AD3F	
B003	EQ	B003	
AD33	EQ	AD33	
AD1E	EQ	AD1E	
7FFE	EQ	7FFE	END OF RAM BUFF R

While we are at it, might as well adjust parameters such as memory size and ACIA port information. Then too, let's disable the EXIT command (no working) and exit back to the MONITOR from BASIC would be fatal as the stack would be re-initialized back over on top BASIC.

The second-last line on the tape is \$105A048010011 which proves to be an auto-start for the SWTP system. This will prove to be a security error in the Altair. Copy the tape over except for this line which you should change to \$805A048010011. It will then be ignored by the loader. The final line of 89 of course signals the end of the load.

The accompanying program will make all final adjustments to BASIC and then self start it for you. Make sure you don't hit RESET while running this BASIC! It's an automatic jump back to the MONITOR and there goes the stack (and the program).

Load in the TSCDL loader program by tuning .J F000. When it is done start it by tuning .J F000. This will start the special loader and will subsequently bring in TSC BASIC.

As compliments to TSC. Their BASIC is a fine and fast running program with easy powerful and desirable features.

Sincerely yours,

Douglas L. Jones

Douglas L. Jones

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8008000054534742020201C
811E40008E3FFF8DFD62C05326F9BDFD62C1392752C13126EE4F8D27C002736
811E401840428D32FF405F8D1B7A40422709E700E1002409B20F04C27CE67D
811E4036438CC6428DF8120F8BDFD365B5B5B5B740618DFD36F840611B3969
811E40518DECF7405F8DE774040FE405F3900000000CE43EFD40CEFD00DFA4
811940642CE0103FF0107CE43F0F0113CE43F7FF01167E01006E
811143F037BDFD62173393714BDFD533397D
89030000FC

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TOTAL ERRORS 00000

ENTER PAGE

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00001      NAM      TSCDL
00002      *
00003      * TSC BASIC LOADER P ORAM
00004      * JANE :980 BLJ V 1.3
00005      *
00006      * SOMETHING FOR THE ALTAR 480-B
00007      *
00008      * THE PURPOSE IS TO PROVIDE A LOADER PROGRAM FOR
00009      * TSC BASIC THAT WILL KEEP THE STACK AND OTHER
00010      * VARIABLES OUT OF THE REGION OF 8000 - 80100
00011      * WHERE PART OF THE TSC PROGRAM RESIDES.
00012      * WILL LOAD IN STANBARD MOTOROLA FORMAT.
00013      *
00014      * THE PROGRAM WILL AUTOMATICALLY ADJUST TSC BASIC
00015      * TO PARAMETERS OF THE ALTAR SYSTEM WITH 17K (33K).
00016      * WHEN LOADED, BASIC WILL BE SELF-STARTING
00017      * FROM THIS PROGRAM.
00018      *
00019      *
00020 4000      DRG      84000
00021      *
00022      *
00023      F042      TAPIN  EQU  8FD42
00024      FFB1      OUTCH  EQU  8FFB1
00025      *
00026      *
00027      * LOAD ROUTINE SIMILAR
00028      * TO LOADER ROUTINE IN
00029      * MONITOR ROM.
00030      *
00031 4000 BE 3FFF      START  LDB      0START-1
00032 4003 B0 F042      JBR      TAPIN
00033 4006 C0 53      SUB  B      #'S
00034 4008 26 F9      BNE      8000
00035 400A B0 F 42      JBR      TAPIN
00036 400C C1 39      CMP  B      #'9
00037 400F 27 52      BEQ      DONE
00038 4011 C1 31      CMP  B      #'1
00039 4013 26 EE      BNE      SD00
00040 4015 4F      CLR  A
00041 4016 B0 27      BSR      BYTE
00042 4018 C0 02      SUB  B      #02
00043 401A F7 4042      STA  B      #'9
00044 401D B0 32      BSR      BADDR
00045 401F FF 405F      STX      SUX
00046 4022 B0 18      BSR      BYTE
00047 4024 7A 4042      DEC      SF9
00048 4027 27 09      BEQ      SD29
00049 4029 E7 00      STA  B      0x
00050 402B E1 00      CMP  B      0x
00051 402D 26 09      BNE      SD2F
00052 402F 00      INH
00053 4030 20 F0      BRA      SD19
00054 4032 4C      INC  A
00055 4033 27 CE      BEQ      SD00
00056 4035 C6 43      LDA  B      #'C
00057 4037 8C      FCB      #BC
00058 4038 C4 40      LDA  B      #'H
00059 403A B0 FFB1      STA  B      0D31
00060 403D 20 F8      BRA      SD31
00061 403F B0 FD36      JBR      #FD36
00062 40 2 50      ASL  B
00063 4043 50      ASL  B
00064 4044 58      ASL  B
00065 4045 58      ASL  B
00066 4046 F7 4041      STA  B      SFB
00067 4049 B0 FD36      JBR      #FD36
00068 404C FB 4041      ADD  B      SFB
00069 404F 1B      ABA
00070 4050 39      RTS
00071 4051 B0 EC      BADDR      BYTE
00072 4053 F7 405F      STA  B      SUX
00073 4056 B0 E7      BSR      BYTE
00074 4058 F7 4040      STA  B      SUX+1
00075 405B FE 405F      LDX      SUX
00076 405E 39      RTS
00077 405F 0000      SUX      0
00078 4061 00      SFB      0
00079 4062 00      SFE      0

```

```

00080      *
00081      * ROUTINES TO ADJUST
00082      * TSC BASIC
00083      *
00084      0040      MEMEND  EQU  840
00085      0042      ACIA    EQU  842
00086      010A      EXIT    EQU  810A
00087      0112      TINCX   EQU  8112
00088      0115      TOUCH   EQU  8115
00089      *
00090 4063 CE 43EF      DONE  LDB      8BTINCX-1SET END OF MEN
00091 4064 DF 40      STX      MEMEND
00092 4068 CE F000      LDB      80F000 ACIA ADDRESS
00093 406B DF 42      STX      ACIA
00094 406D C0 0103      LDX      #0103 DON'T ALLOW EXIT
00095 4070 FF 0107      STX      EXIT+1
00096 4073 CE 43F0      LDX      8BTINCX POINTER TO TAPE IN
00097 4076 FF 0113      STX      TINCX+1
00098 4079 CE 43F7      LDX      8BTOUTCH POINTER TO TAPE OUT
00099 407C FF 0116      STX      TOUCH+1
00100      * ALL DONE 8F00LDM; NOW START
00101 407F 7E 0100      JMP      80100
00102      *
00103      * TAPE UTILITY ROUTINES
00104      *
00105 43F0      DRG      843F0
00106      *
00107      * FOR 17K MEMORY
00108      *
00109 43F0 37      ATINCX  PBN  B      TAPIN  TAPE INPUT ROUTINE
00110 43F1 B0 FD47      JBR      KEACR
00111 43F4 17      TBA
00112 43F5 33      PUL  B
00113 43F6 39      RTS
00114      *
00115 43F7 37      STOUTCH PBN  B      TAPE OUTPUT ROUTINE
00116 43F8 14      TAB
00117 43F9 B0 FD45      JBR      #FD45 KEACR OUTPUT
00118 43FC 33      PUL  B
00119 43FD 39      RTS
00120      *
00121      END

```

TOTAL ERRORS 00000



GIMIX INC. 1337 WEST 37TH PLACE • CHICAGO, ILLINOIS 60608 • (312) 227-5510 • FAX: 312-221-4058

GIMIX will be demonstrating at booths 971-2 at the N.C.C., 6809 37th St. that can use Flex, Uniflex, OS9, Forth, and other software. Ken Kaplan of Microware, Ray Talbot of Kenyon, and other software experts will be available at the GIMIX booths to answer detailed questions on their software. Software application programs such as Stylograph will also be demonstrated. GIMIX will show their graphics board and new DMA controller for 5" and 8" drives.

The N.C.C. is May 4-7, at the Chicago McCormick Place. Any 68xx readers who plan to attend are invited to stop by. If you have specific software that you feel will be of interest at this show and you would like demonstrated, please contact Richard Don at GIMIX in advance. If you want free guest admission tickets, please send your request in writing to GIMIX. Please enclose a label or self-addressed envelope.

GIMIX, Inc.
1337 West 37th Place
Chicago, Illinois 60609

Don Williams
'68' Micro Journal
3018 Hamill Road
P. O. Box 849
Hixson, Tennessee 37343

Dear Don,

In keeping with our custom of giving the user the most versatile hardware possible, we designed the card to be able to read disks whether the side byte of the ID field was written or not. This enables us to read virtually any disk that is FLEX or OS-9 format compatible. The 'FORMAT' program for the GIMIX Double Density programmed I/O controller and the forthcoming GIMIX DMA controller formats the disk with the side byte of the ID field set properly when formatting double density insuring that 5" disks written on either controller are compatible. This was done to maintain IBM eight inch floppy compatibility.

After the GIMIX Double Density controller was finished we found out about the SWTPC DC-4 controller. SWTPC chose to use the side select output of the 1797 to control their density select

feature. This makes transportation between the two controllers all but impossible except in the single sided, single density mode. We will have available, at a later date, a FLEX utility that will enable owners of the GIMIX Double Density controller to read double density disks from the SWTPC DC-4. However, it is not possible to read a GIMIX double density formatted disk on the DC-4. We recommend that all data exchange be done in the single sided, single density, 48 tracks per inch mode to insure complete compatibility.

I hope that this answers your question as to the rationale behind the design of our double density controllers.

Sincerely,

GIMIX, Inc.
Robert Phillips, President

NOTE: Don Williams and other 68 Micro Journal staff will also be at the N.C.C., to meet and swap "tall tales" with any readers who wander in.

If you expect to attend contact GIMIX for the "FREE" guest tickets, as without tickets you will be \$25.00 lighter if you get inside.

Check for us around the the GIMIX booth as Richard Don of GIMIX has promised a chair or two for 68XX users and 68 Micro Journal staff get together.

Hope to see a lot of you there.

DMW —



February 12th, 1981

PRESS RELEASE

Find Your Way to San Jose - for Computer Swap America

The Spring '81 Computer Swap America (formerly California Computer Swap Meets) will be held on Saturday, April 25th, from 10AM to 6PM at the Santa Clara County Fairgrounds in San Jose, California (244 Tully Rd.). Manufacturers from all over the computer industry, computer stores, software vendors and individuals come to this event with both top of the line and used merchandise. For six years computer enthusiasts have been coming out to buy this merchandise...which ranges from complete microcomputer systems to integrated circuits, disk drives to diskettes, application programs to games, books, magazines, T-shirts, and much more.

A special Consignment Table will be available for selling 1 or 2 items and a free Literature Table is available to anyone within the industry. Admission to buyers is \$2.50. Sellers, both individuals and companies, should call 415-966-6546 (a friendly answering service) for booth prices, availability and reservations. Or, write to: Computer Swap America, PO Box 52, Palo Alto, CA 94302.

This semi-annual "happening" within the personal computing field is sponsored by John Craig, publisher of InfoWorld. He states that, "Having a good time at this event is not optional...it's mandatory."

(415) 966-6546

SHELL SORT

Software Dynamics Basic, Ver 1.2

There are several nice features to be found with Software Dynamics Basic that might take a bit of getting used to. One of these is the speed of operation. The attached short sorting program not only will demonstrate the speed of execution but also show the ability to handle array sizes of greater than 255 in RAM.

My machine is a 8800 SWTPC that has been jacked up to run at about 1.8 Mhz in order to use the 598-609. (I have never had a second of trouble with my dual 8" 988 disk in over two years of heavy useage. Congratulations.)

No. in array	Results	Time (sec)
100		2.6
255		7.4
1,000		41
1,500		61
2,500		134

Gene Embry ---- Route 1 Box 151-M ---- Morrisville, NC 27560

DEM SHELL.BAS

```
DIM ARRAY(2500),ANSWER(1),BELL(17)
DIM N(2500),I,J,K,L,M,SPARE,X
```

100 PRINT "Shell-Metzner Sort"

PRINT

N = 1000

PRINT "The maximum size of the array is 2500"

PRINT

INPUT "How big an array to test? " N

IF N > 2500 THEN PRINT \ DOTO 100 \ REM Error

N = INT(N)

PRINT "Forming the 'N' size array."

FOR X = 1 TO N

ARRAY(X) = INT(RND)

NEXT X

PRINT

INPUT "WHEN STOP WATCH IS READY PRESS RETURN ? " ANSWER

DOSUB 3000 \ The Sort

500 REM PRINT ARRAY

PRINT BELL

FOR X = 1 TO N

PRINT ARRAY(X);

NEXT X

PRINT

GOTO 100

9000 STOP

3000 REM The Shell-Metzner Sort

M = N

IF M = 0 THEN 3090

J = 1

K = M - M

3150 J = J

3160 L = 1 + M

IF ARRAY(J) < ARRAY(L) THEN 3170 \ No swap

SPARE = ARRAY(J)

ARRAY(J) = ARRAY(L)

ARRAY(L) = SPARE

I = I - M

IF I < 1 THEN 3170

GOTO 3160

3170 J = J + 1

IF J <= K THEN 3150

GOTO 3110

3090 RETURN

END

ALFORD & ASSOCIATES

PO BOX 4048, Richmond, Virginia 23206
8000 Chamberlayne Avenue, Richmond, Virginia 23206
PHONE: 804-686-8700

17 February 1981

ADVANCED PRODUCT INFORMATION - "THE SPEAKER"

Beginning in mid-March, Alford and Associates will be shipping its new voice interface board, THE SPEAKER, for 6800 and 6809 systems.

THE SPEAKER is an assembled and tested 3-1/2" by 5-1/2" board designed to plug into the 30-pin I/O bus on the standard 99-50 mother board. Utilizing the new Votrax SC-01 large-scale integrated circuit phonetic synthesizer chip, THE SPEAKER produces speech of the highest quality, while requiring the least memory and processor overhead of any speech synthesizer on the market today. Typically, only about one byte per letter is required to

store English speech for THE SPEAKER, and a data rate of about ten bytes per second drives the board at its maximum throughput.

Standard features of THE SPEAKER include user-programmable inflection and voice pitch under software control. Included on the board is a speaker amplifier producing about 1/2 watt into a 4- or 8-ohm speaker (not provided).

A number of application programs are provided with THE SPEAKER which will allow the user to begin to generate speech from his or her system with the minimum of effort. The software is provided in 6800 or 6809 code for either TSC or SSB disk operating systems, and is available on either 5- or 8-inch disks (please specify operating system, disk size and 6800 or 6809 code when ordering).

THE SPEAKER is available for only \$229.95, continental shipping and handling pro-paid. Overseas orders, add \$15 for shipping. Orders may be paid by VISA or Mastercard, by personal check or by bank draft payable in U.S. funds. UPS COD orders will also be accepted. Virginia residents add 4% state sales tax.

weldy moffatt

1112 college ave
regina sask canada
S4P 1A9

81 feb 18

68' Micro Journal

With 2 6800 systems of my own and maintaining a close liason with 5 other owners it is important that software and hardware compatability exist

One of my systems uses the Percom Electric Window and both use the HUMBUG monitor. The ideal way to run the window is to input from the keyboard with a parallel port and when a port 1 is serial the bus outputs to the window at the input baud rate. P1STAT (\$A015) initializes at FF and by changing this location to 00 the bus will output to the window at processor speed. My input isthrough a CT1024 terminal

My system disk includes the recently published RET.CMD and I have added a line to clear P1STAT. Calling this routine then sets up the TTYSET for terminal operation and the window for full speed operation.

My thanks to the author of RET CMD and to Peter Stark for a fine monitor.

Weldy

NAME RET

* PROGRAM TO CONFIGURE TTYSET FOR PERCOM 16 X 00
* DISPLAY WITH DRIVER IN HUMBUG MONITOR

* ALL RIGHTS RESERVED *
* WELDY MOFFATT *
* 1112 COLLEGE AVE *
* REGINA CANADA S4P 1A9 *

* SWITCH - RET.LIST.FUDGEFILE.DAT

* COUNTS

PC024 PC03	PC01 W000	PC02 L00	PC03 W000
A100	PC01	PC02	A100
A100 20 01	RET	PC01	PC02
A102 02	PC01	PC02	PC03
A103 06 10	PC01	PC02	PC03
A105 07 PC 03	PC01	PC02	PC03
A108 4F	PC01	PC02	PC03
A109 07 PC 03	PC01	PC02	PC03
A10C 07 PC 03	PC01	PC02	PC03
A10F 06 FF	PC01	PC02	PC03
A111 07 PC 03	PC01	PC02	PC03
A114 00 PC 24	PC01	PC02	PC03
A117 7C PC 03	PC01	PC02	PC03

NO ERRORS DETECTED

SYMBOL TABLE

BEGIN A103 PC01 PC02 RET A100 UN A102 W000 PC03

***** Testing Hash and Rehash Functions

There are times when the use of a hash function is the best way to handle certain arrays or data files. However, you must be absolutely certain that the re-hash function will operate the way it is planned. The plan calls for it to generate up to M-1 unique numbers within the range of 1 to M, where M equals the size of the data file. If the number returned from the re-hash function starts repeating before all M-1 numbers have been generated you have a defect in the program.

The following program, HASH.TXT, allows you to test any hash and re-hash functions. I only use slots 1 to 7 in array A() since I normally use Computervision's notion of BASE=1. To speed up the testing, I use Software Dynamics' compiler basic. I have tested the hash and re-hash functions in the program with a KEY from 1 to over 1,000,000 without error!

Gene Embry ---- Route 1 Box 191-M ---- Harrisville, NC 27560

```

REM HASH.TXT
DIM M/77,A(81),KEY,G1,RECORD
DIM X,SPARE,START,FINISH
PRINT
100 REM Allow a start & restart
PRINT
INPUT "ENTER START NUMBER? "START
INPUT "ENTER ENDING NUMBER? "FINISH
REM Test all KEY values
FOR KEY = START TO FINISH
IF KEY/50 = INT(KEY/50) THEN PRINT KEY:
FOR X = 1 TO M \ REM Set array to zero
A(X) = 0
NEXT X
GOSUB 1000 \ REM Hash first number
A(RECORD) = 1
FOR X = 1 TO M-1 \ REM Fill up the array
GOSUB 2000 \ REM REHASH
IF A(RECORD) = 1 THEN 3000 \ REM Bad re-hash function
A(RECORD) = 1
NEXT X
NEXT KEY

REM End of a successful run
PRINT
PRINT "Run ok from "START" to "FINISH"."
GOTO 100

1000 REM Hash Function
G1 = -M
SPARE = KEY
RECORD = M * (KEY/M - INT(KEY/M))
RECORD = INT(RECORD + .5)
IF RECORD = 0 THEN RECORD = M
RETURN

2000 REM Rehash
G1 = G1 + 2
SPARE = SPARE + ABS(G1)
RECORD = M * (SPARE/M - INT(SPARE/M))
RECORD = INT(RECORD + .5)
IF RECORD = 0 THEN RECORD = M
RETURN

3000 REM Report error and re start
PRINT
PRINT "ERROR"
PRINT "KEY "KEY
PRINT "X "X
GOTO 100 \ REM Do it again
END

```

PRODUCT ANNOUNCEMENT

AMATEUR RADIO SOFTWARE
FOR THE RADIO SHACK COLOR
(6809) COMPUTER(TES80C)

ESTV KEYBOARD SOFTWARE

CONVERT ANY RADIO SHACK COLOR COMPUTER TO AN AMATEUR RADIO ESTV KEYBOARD. THIS PROGRAM RUNS ON A STANDARD (UNMODIFIED) 8K COLOR COMPUT-ER. THE PROGRAM IS LOADED FROM A CASSETTE BY THE BASIC "LOAD" COMMAND. A SMALL INTERFACE MUST BE CONSTRUCTED FROM A SINGLE (XR-2206) AND A FEW DISCRETE COMPONENTS, WHICH ARE ALL AVAILABLE BY MAIL ORDER. THE PROGRAM FEATURES ARE:

1. UP TO TEN DIFFERENT ESTV PICTURES CAN BE STORED IN MEMORY AT ONE TIME.
2. EACH ESTV KEYBOARD PICTURE CAN BE TRANSMITTED (LOOP) TEN TIMES IN ANY ORDER DESIRED.
3. UP TO TEN DIFFERENT PICTURE-LOOPS CAN BE TRANSMITTED.
4. ESTV PICTURE FORMAT IS SIMILAR TO THE FORMAT PUBLISHED IN "73 MAGAZINE" JUNE 1977. AN ADDITIONAL GRAY LEVEL BAR IS PLACED ON THE BOTTOM OF THE PICTURE (8 LEVELS).
5. CHARACTERS AND BACKGROUND CAN BE REVERSED BY KEYBOARD ENTRY.
6. AN EIGHT GRAY LEVEL PATTERN CAN BE GENERATED FOR ALIGNMENT AND TEST PURPOSES.

PROGRAM COSTS WITH CASSETTE AND DOCUMENTATION \$20.00

FUTURE SOFTWARE WHICH WILL BE DEVELOPED DURING 1981:

RTTY PROGRAM
-SPLIT SCREENING
-RECEIVE AND TRANSMIT 60WPM BAUDOT
-110 BAUD ASCII
-USE YOUR EXISTING T.U.
-NO TRS80C MODIFICATIONS REQUIRED

RS232C PICTURE RECEPTION
-USE YOUR 16K COLOR COMPUTER TO DISPLAY RS232C PICTURES
WITHOUT ANY TRS-80C MODIFICATIONS.

SOFTWARE SOURCE:
CLAYTON ABRAMS (K&ALP)
1758 KESTOCK LANE
SAN JOSE, CALIF.
95124

Electronic Specialists, Inc.
171 South Main Street, Natick, Mass. 01760
(617) 655-1532

NEW PRODUCT RELEASE

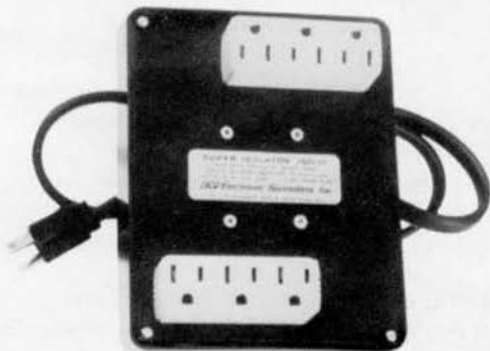
FOR IMMEDIATE RELEASE

FOR MORE INFORMATION: FRANK STIFTER

SUPER ISOLATOR

Severe AC Power Line Spikes, Surges and Hash are prevalent in many MicroProcessor installations. Program execution is plagued with unexplained crashes, memory loss or other glitches. Disks, printer and processor often interact, aggravating the problem.

ELECTRONIC SPECIALISTS' recently announced MODEL ISO-11 is designed to curb these severe electrical problems. Complementing the popular SUPER-ISOLATOR line, the MODEL ISO-11 features two individually dual-PI filtered AC socket banks (6 sockets total). Heavy-duty spike/surge suppression is incorporated in the design. Equipment interactions are eliminated and disruptive/damaging line spikes and hash are controlled.



The MODEL ISO-11 SUPER ISOLATOR controls power line Spikes and Hash while providing interaction free microprocessor operation. \$94.95

ELECTRONIC SPECIALISTS, INC., 171 South Main Street
Natick, Massachusetts 01760 Phone: (617) 655-1532



WINCHESTER DRIVE
CONTROLLER
Model 104 controller family

ADVANCE PRODUCT INFORMATION

PRELIMINARY SPECIFICATIONS December 1980

INTERFACE ** First model will be for SEAGATE ST-506
** SEAGATE 1000-series compatible

CAPACITY ** 5,326,848 bytes (formatted) on ST-506

ARCHITECTURE ** Full-track buffer

** Buffer mapped into main memory for high-performance systems, or accessed through ports for low-cost systems

** Built-in floppy disk interface

** Unformatted format for faster avg. access, low cost

** 100% TTL implementation...no bit slice processors.

** Two-level error detection for increased data integrity

** CRC encoding/decoding for high-reli., low-cost data-processor

** Optics allow dual rack-buffers for overlapped I/O, mapped/ported buffer access, off-board checksum generation

** Full-track buffering makes most accesses memory-to-memory... effective transfer rate limited only by host computer's bus

PHYSICAL ** Two 4" x 6" P-C boards, may be piggy-backed

** total area under 50 sq. inches.

** Requires +5V (-5V also for Seagate SA-1000)

SOFTWARE ** Extremely simple driving software.....

** easier to control than 1771/1791 SOC

** Drivers for UCSD Pascal in 6809 easy, language available free to qualified OEMs

PROJECT STATUS ** CSI-470 bus phase I prototype functional in September '80

** Encoder/decoder P-C boards in late December '80

** CSI-470 bus phase II prototype in February '81

** CSI-470 bus interface prototype in March '81

** Q-bus interface planned

** custom bus interfaces available ... consult factory

For more information contact:

Tallgrass Technologies
CORPORATION
P.O. Box 12047
Overland Park, Kansas 66212
(913) 381-5588

"UCSD Pascal" is a registered trademark of the Regents of the University of California.

THIS DOCUMENT CONTAINS INFORMATION ON A PRODUCT UNDER DEVELOPMENT. TALLGRASS TECHNOLOGIES CORPORATION RESERVES THE RIGHT TO CHANGE OR DISCONTINUE PRODUCT WITHOUT NOTICE.

Don Williams, Sr.
68 Micro Journal
3018 Hamilton Rd
Bixton, Tennessee 37343



Tallgrass Technologies Corp.
7623 West 86
Overland Park, KS 66212
(913) 381-5588

Dear Don,

Per your request here are my thoughts about an offering for the 'Color Computer' community:

Tallgrass is in an excellent position regarding 6809 products. We are licensed to distribute UCSD Pascal Version II.0, and have functional hardware for floppy disk controllers and Winchester drive controllers. We now also have a working board which adapts 64K RAMs for use in the Color Computer. So we can supply everything for a 64K system except the CPU, which presumably Randy will be able to supply. If FLEX is desirable it is my understanding that we can get licensed to distribute it too for a reasonable fee. We could probably sell 64K RAMs, floppy, and UCSD Pascal bundled together for around \$900. I note that independents are now selling dismantled Color Computers, so perhaps we could sell the package with the Color Computer for around \$1200-\$1300.

As regards the disk drive, Sony has announced a "microfloppy" drive with a 3.5 inch diskette in a metal cartridge. It stores 437K double density and rotates at 600 RPM, twice the speed of the "minifloppy." We are pursuing Sony in the hopes of using their drive with the Color Computer. This drive is being used in Sony word-processing equipment and should be available in sizable quantities starting this summer.

This whole package sounds pretty attractive for schools. I would be interested in your comments and those of any readers who might be interested.

An interesting tidbit came to my desk from Fujitsu today. They have a 64K RAM promotion program whereby they will sell you 10 chips for a total of \$150. Company purchase order required; one per company. NEC, Intel and Motorola are scrambling around trying to make the same offer. Looks like Fujitsu may have packed six months of price erosion into three weeks.

Thanks for your support and encouragement.

Regards,
David M. Allen
David M. Allen
President



**technical systems
consultants, inc.**

P.O. Box 2570 • 1208 Kent Avenue • West Lafayette, Indiana 47906 • (317) 463-2502

Uniflex™ Gains Sort/Merge Package

Technical Systems Consultants, Inc. has announced the availability of a full-disk sort/merge package for operation with the 6809 Uniflex Operating System. Written in 6809 assembler language, the package features a convenient operator interface and very fast sorts. Any size and type file may be sorted with parameters for the sort supplied as part of the command line, through use of a "parameter editor", or in an existing parameter file. The package sorts files of any size by breaking them into multiple, temporary files which are individually sorted and then merged into one. It also performs merges on previously sorted files. Both input and output can be routed to most any device through the facilities of Uniflex. Some of the package features

include, any size, fixed or variable length input records, fixed or variable length fields, up to 20 input or output keys, key length of up to 250 characters, supports ascending or descending and right or left justified keys, user-definable sorting sequence, run-time messages, and a powerful record select/exclude feature. A single quantity license is \$100.00 with maintenance available for \$50.00 per year from Technical Systems Consultants, Inc., P.O. Box 2570, West Lafayette, IN 47906. Telephone: (317) 463-2502, Telex: 276143.

Inter[™]systems CORPORATION

Box 458
Peterborough, N.H. 03450
Phone 603-984-0148

New address:
Box 5245 - Manchester NH 03108
(603) 774-7762

12 February 1981

"68" Micro Journal
3018 Gamill Rd
PO Box 849
Mixon TN 37343

Attn: Don Williams

February 10, 1981

68 Journal:



I would like to inform others of my good experiences with two of your advertisers. I ordered a 16K dynamic memory kit from Southeastern Micro Systems as soon as their ad first appeared. The board was on my desk three days later! I ordered a kit since I prefer to socket all of my ICs and was amazed to find they included enough Auxat sockets for the RAMs on a fully loaded 64K board. I assembled the board (adding sockets for the support chips) in a few hours helped by the fact that it is solder masked and silk screened. Since I have always used static boards for my SWTP 6800 I was fearful of all the support ICs required for dynamic RAMs. To my delight the board worked first time! My only dismay was like all dynamics I've seen, the manual states flatly that the board will not run faster than 1 MHz. Since that would slow my new 6809 down below my static memory computer, I sent a letter and SASE to Southeastern asking if the board could be adapted for higher clock speeds. A few days later a message was on my desk: I had a call from Georgia saying they were sending information on increasing the board to 1.5 MHz. I'm quite impressed with this service from a company new to the 'Journal'.

In the same issue I found an ad for a FLEX version of ANVENTURE. I sent a check to Application Services Company not quite believing their claims. I was very impressed that they really did fit the complete Crowther and Woods Colossal Cave in about 35K RAM. Unlike the 'RIN' computers, response time to commands is instantaneous. Complete testing of the program would take weeks but so far I haven't found any deviations from the original ANVENTURE. My only complaints are the lack of a suspend command and a few hardware dependencies. The program relies on MIBUG/SWBUG routines for I/O and may not run on some ROM monitors. Also the loader wasn't written with 2 MHz systems in mind and my disk wouldn't boot occasionally. These problems are surmountable and are the result of the size of the program which overloads using FLEX for I/O.

Leo Taylor
18 Ridge Court West
West Haven, Conn. 06516



Micro Design Ltd.

"68" MICRO JOURNAL
New Products Editor
P.O. Box 849
Mixon
Tennessee 37343 U.S.A.

Company's Web
Industrial Estate
North Moleham
Norfolk NR26 0AM
Tel: (06924) 6100
Telex: 975212

TO: MCD/M: 787 24/2/81

PRESS RELEASE INFORMATION

Windrush Micro Design Ltd., 60 Myers Way Industrial Estate, North Moleham, Norfolk announce the introduction of a Logic and Power Supply Monitor to their range of 8-30 computer boards.

FEATURES

- * Logic monitor is fully buffered on the address and data lines.
- * Word trigger is set up on four hexi-decimal switches.
- * Data is displayed and latched.
- * BNC connector for word trigger output to an oscilloscope enables software and hardware diagnostics without recourse to costly logic analysers.
- * Power supply monitor is guaranteed to sequence M0, M0.5 and U0 under all power supply voltage conditions. Protects non-volatile memory, disc systems, and initiates controlled startup and shutdown of the system.
- * Adjustable trip thresholds on all three unregulated supply rails.
- * Flashing Low M0 (no becomout) warning on U0.2.

Directors: J.B. DADY W.C. DICKINSON

Registered in England No 1429509 VAT No 324 5026 89

Dear Mr. Williams:

The SWTPC MP-09 processor board has three sockets which may be used for additional ROM or RAM provided their addresses do not overlap with the addresses of peripherals. Unfortunately, the address space from hexadecimal 2000 to F7FF is used by several types of peripherals, such as the 30-pin IO ports, the DMA controllers, etc.

The seven ports are most wasteful of addresses on the MP-09 motherboard; e.g., address 2005 for data from port one is also available at EP05, resulting in a conflict with IC2 on the MP-09A processor board. The following modifications to the MP-09 board result in an address space from 2000 to 20FF; IC2 can now be utilized by the MP-09 providing an additional non-contiguous 2K bytes for specialized purposes:

a) Perform all modifications as prescribed by SWTPC on page MP09-14 and on the addendum (6.8K Ohm resistor to pull up -P10Q), a total of six steps. Then continue;

b) Cut and remove the trace from A5 to IC6-4 and to IC5-5; cut between IC5-6 and IC5-7; cut and remove the trace from IC3-6 to A11 and remove A11; cut and remove the trace from IC3-5 to ground; ascertain that all cuts are clean and that neighbouring traces have not been affected.

c) Connect A11 with IC5-6 and A10 with IC5-5; then connect IC5-4 to IC3-6. When one or both of A11 or A10 is high a port cannot be selected.

d) Connect A9 with IC6-4; when A9 is high, selection will be inhibited. Connect A8 with IC3-5; when A8 is low, selection may occur.

e) Install and test the board. IO ports should not respond outside the address range of 2000 to 20FF. Now IC2 on the MP-09 may be utilized.

Sincerely yours,

InterSystems Corporation

Manfred Peschke



HELP

My three year old SWTPC 6800 (8K) is idle because I can't get my CT-64 to work properly. If anyone in southeast Wisconsin can offer assistance, please write. Dean Rectenwald, 135 Capitol Drive, Pewaukee WI 53072.

I am building a home-brew system on the Heath ET/ETA-3400 educational microcomputer. I want to standardize the expansion on the SS-50/SS-30 bus, but have been unable to locate the pinout of the bus here in Germany. I would appreciate any information concerning the pinout or availability of reference books dealing with the bus you can provide. Michael R Turner, WMC 2d Signal Brigade, Box 323, APO New York 09086.

CLASSIFIED

SWTPC 6800 System - 48K, MP-5, AC-30, 6850; SSB Triple Minifloppy 9850; Bantex CRT 9600. Joe Micklund, 801 Duchess Rd, Bothell Wa. 98011 206-481-3573.

For Sale: SWTPC6802 syst/parts, 82 mainfr, MPA2 MPU, 40K ram, serial/parallel cards, Percom LFD400 FDC, Epron prg, calc cards: 9900; M19 tere, Base 2 prt: 91300 w/syst. HiPlot DMP2 plot: 9800; Hewlett-Packard 85 computer, 4 software

packs, 6 data cassettes, 2 paper rolls- little use in 9 months: \$2900. Doug Ramers, Box 100B, Dover DE 19901, 302-674-6386 (Days).

SWTPC 4K board \$45; 8K board \$95; JPC CK-7 RT Clock w/aux pwr \$45; MicroWare RT/68MX ROM \$45. Full Docs. C. Silvia, PO Box 234, Hines IL 60141.

Wanted old style SWTPC chasis and motherboard with or without power supply, any condition. S Davis, 39 Carol St, Danbury CT 06810.

SWTPC 8K memory board (fully socketed) \$115; SWTPC DC3 Disk Controller (factory wired) \$125. Tom Harmon, 1922 Huntress Lane, Houston TX 77062.

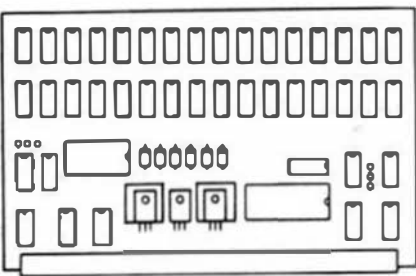
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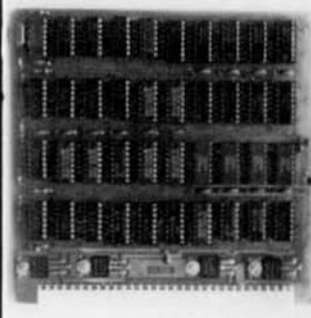
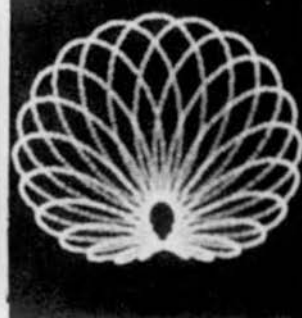
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* single instruction erase	* no splatter on update
* independent blanking control	* no adjustments
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Specifications

Resolution	256 x 256 (256 x 250 on some monitors)
Bandwidth	8 MHz
Stability	crystal controlled
Addressing mode	X-Y single pixel
Origin	upper left corner
Writing rate	64 microseconds per pixel
Erase time	16.7 milliseconds
Write sync	interlocked
Blanking	program controlled
Output signal	non-interlaced composite video
Memory	65,536 bits in X-Y array on board
Registers	Write: X, Y, Z, Erase Read: status
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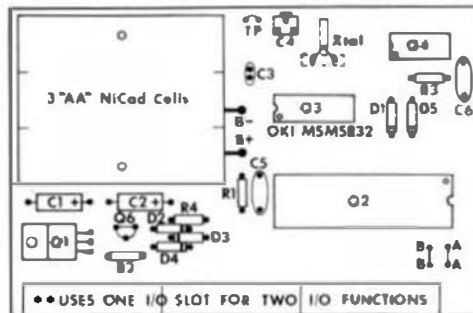


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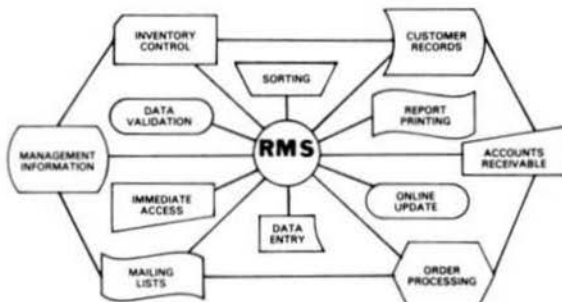


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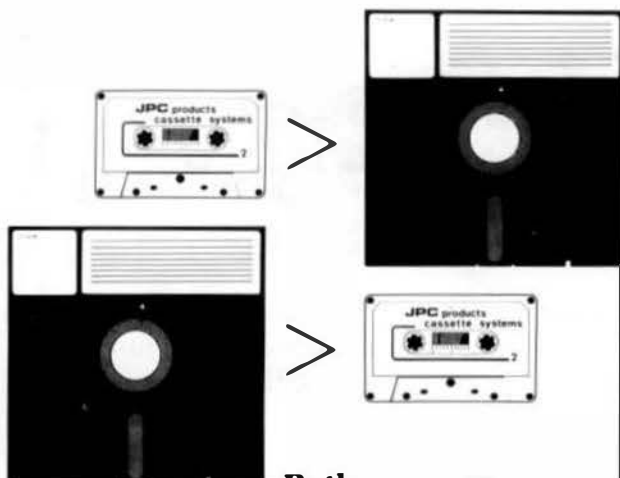
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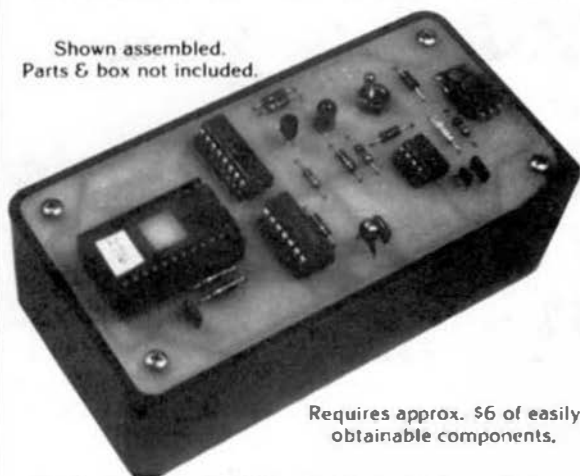
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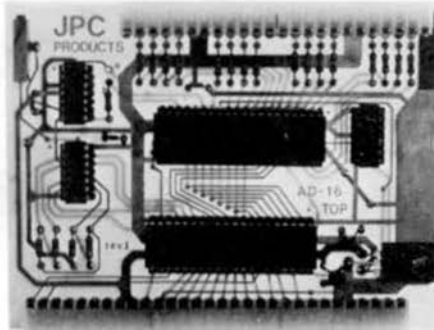
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Printer commands. Control characters can be sent to the printer for format control either directly from the control terminal or by imbedding them in the text. The Set command contains interface initialization and character output routines to support the SWTPC MP-C interface as well as the standard serial and parallel interfaces. User also selects the port address (0 thru 7, A or B) thereby eliminating the need for the user to install printer software routines.

Editor allows exiting to either the monitor or DOS and then reenter (Warm Start) without destroying previously prepared text in the buffer. The Restart command erases contents in the buffer without the user having to reload the editor.

The Editor allows the user to toggle between full duplex (no echo) and half duplex (echo) as needed. It responds to commands in both upper and lower case and can be used to create assembler source code and Basic programs as well as text.

What do you have to lose? Specify 6800 or 6809, SSB or FLEX and Version. Source listing is available for an additional \$35.00



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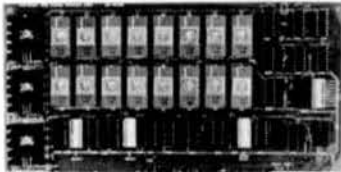
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At Last! An affordable 32K Static RAM with full 6809 Capability.

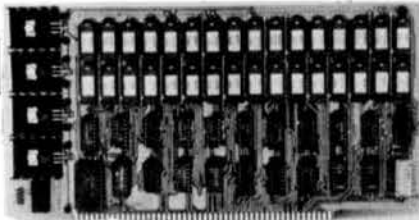
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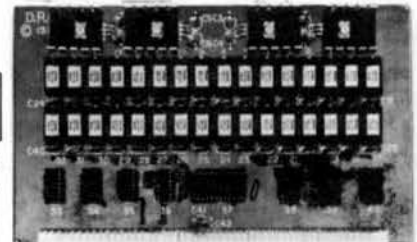
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- optionally generates 6809 relocatable code
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- memory changes to program thru full-screen editor
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PRICING: Compiler package including assembler, linker, and debugger \$215
 for source of runtime add \$ 50
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IMAGINE

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You know that compatibility with existing software and operating systems is the single most important requirement in your design. You decide early in your plan that ability to easily run operating systems such as FLEX, PASCAL, MTS, and FORTH is a priority item. Along with compatibility, you also decide that you want to provide the highest possible level of computing performance.

RESULTS

For many of your users, a convenient and attractive package will be as important as the stuff that's inside. Your ultimate 6800 system will have to be more than a collection of modules, boxes, and power supplies if it is going to serve users who want Results as much as they want technology.

Your ultimate 6800 system won't forget OEM'S and Systems Houses either. Real-world applications usually call for modularity, adaptability and flexibility. You want to make sure that your ultimate 6800 system has both RS-232 serial interfaces and parallel input-output. If possible the system will provide space and power for custom circuitry inside the main enclosure.

As you spend endless hours thinking and planning the ultimate 6800 system, one question keeps coming up, time and time again: how can you include all of these wonderful features in the system and still keep the cost down so that low price will be a benefit, too?

A BREAKTHROUGH

One night you wake up and suddenly know the answer! The answer is to put your ultimate 6800 Computer in the same box with a high-quality, human-engineered keyboard/display. That way you can save the expense of separate boxes and make a product which really is the ultimate 6800 system. By choosing a terminal design that incorporates microprocessor control, full-function keyboard and high-resolution characters you can add the benefits from hundreds of thousands of development dollars to your design and still have the best price/performance in the industry.

THE WAVE MATE 2000

What you have done is design the Wave Mate 2000, truly the ultimate 6800 Computer system. This compact and attractive Computer takes up no more space than an office typewriter, yet has the power of a full-blown system. It's more than just another pretty face, too. Everything inside the two-tone grey enclosure is built for long life and high performance.

You can't help but feel that the 21st Century has really arrived when you start the system just by turning on the power and sliding in a disk. Within a second or two a beep comes from the annunciator, telling you that the Z-80 keyboard-display controller has found itself in good working order. A few moments later a second beep announces that the 6800 CPU has successfully tested all 64K of memory. The disk drive loads your system in seconds, and you're on your way!

Whether you have a disk drive in your main Series 2000 enclosure or have all of your disks outboard, you can still have up to 2.8 megabytes of dual-density 5.25 inch floppy disk storage...or as little as 180K bytes. And if you need more storage, there's a Winchester waiting just for you.

From the 72-key keyboard with special function keys and separate numeric keypad to the 7x9 matrix characters on the 12-inch display screen, the Wave Mate 2000 gives you the feel of a machine that can handle just about any job well. Should your special application require it, you can program up to 21 different special functions to operate with a single keystroke. If you want Graphics, you make graphics. If you want Reverse Video, you reverse it. If you want Cursor Addressing, you address it. Easy, clean, and carefully thought out.

DID WE MENTION PERFORMANCE?

The performance of a plain old 6800 system isn't bad. The performance of the Series 2000 is TWICE AS GOOD in just about every way you can imagine. For one thing, the clock is twice as fast, at 2 megahertz, which makes the instructions run twice as fast. Memory, all 64K of it, is fast enough to keep up with computation with no waitstates or other kinds of fudging, which means that memory is at least twice as fast. For another thing, the disk transfer rate is twice as fast, because disk storage format is Double Density, which gets your software into and your results out of your Series 2000 Computer twice as fast. Having an extra CPU around to manage the keyboard/display helps performance, too, because the 6800 CPU doesn't have to worry about communications house-keeping. Communications with the console keyboard/display and the two RS-232 interfaces is handled in the most efficient possible manner...under Interrupt Control.

WE DO NOT FORGET THE OEM

Little things inside the Series 2000 Computer exist for the pleasure and convenience of those special people who do not simply use Computers but take them, make them into special forms, and then pass them on to others who use them as timesavers, as helpers, and as tools for



profit. Among these little things are I/O interfaces, right inside the machine, which permit attachment of 3 physical and 8 logical devices to the very innards of the Series 2000 Computer. Through these connections the Series 2000 Computer may control, measure, test, time, start, stop, or merely converse with almost anything.

WHAT MORE CAN ONE SAY?

A lot more can be said about this excellent product, because it truly is the ultimate 6800 system. At least four major operating systems are up on the Series 2000 Computer and a lot of useful software runs under the operating systems. Systems begin at \$3195, with substantial discounts for quantity purchases.

Call us at (213) 644-0113 or write us at our Hawthorne, California address and we will send you what you need to know about the Wave Mate 2000. We are building a Dealer Network for the Series 2000 and welcome inquiries from competent firms.

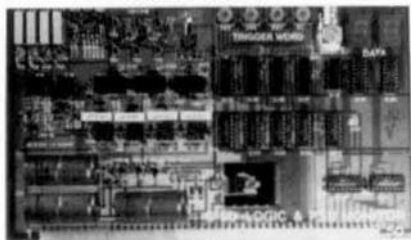
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This is a one-pass linking loader which allows separately translated relocatable object modules to be loaded and linked together to form a single executable load module, and to relocate modules in memory. It produces a load map and a load module in Motorola MIKBUG loader format. This book provides everything necessary for learning about this system and the nature of linking loader design in general.

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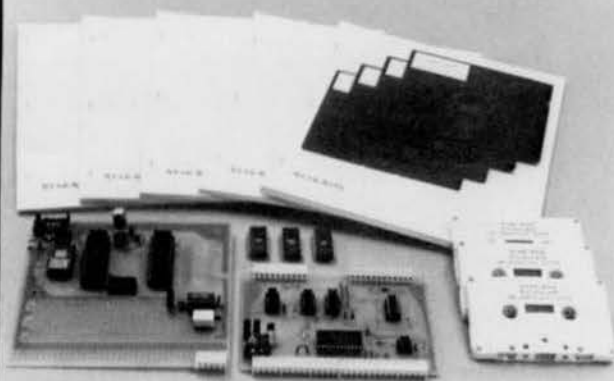
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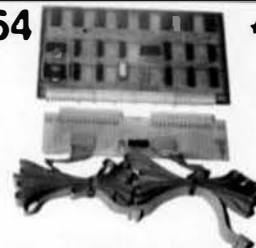
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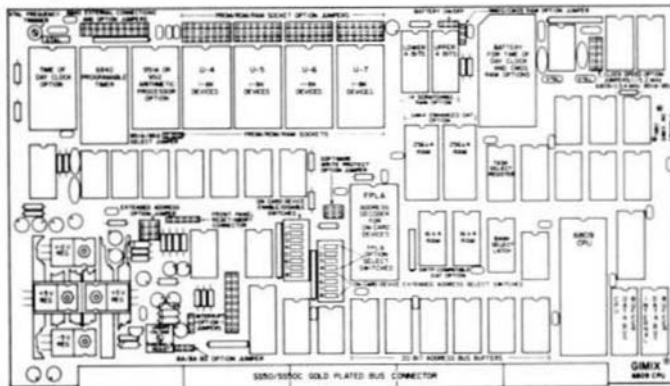
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NOTE: The GIMIX 6809 CPU BOARDS do not include a baud rate generator. In systems that require a baud rate generator, it must be provided elsewhere. The GIMIX 6800/6809 motherboard includes a baud rate generator on the mother board.

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GMXBUG 09 is available for all versions of the GIMIX 6809 CPU BOARD. GMXBUG 09 includes advanced debugging capabilities, as well as utility and memory manipulation routines. It is available in both terminal and video based versions. The terminal based version is 2K long and requires a standard ASCII serial terminal. The video based version is 3K long and requires a GIMIX 80 x 24 VIDEO BOARD and a parallel ASCII keyboard. The terminal version can be upgraded to video based by adding the extra 1K PROM, without modification to the original 2K terminal version.

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